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ABSTRACT

This guidebook has been prepared as a counseling resource for high school students and counselors, and management and personnel workers seeking information on occupations in the health field. Included is a brief overview of the health field along with information pertaining to career planning, sources of financial aid, and descriptions of more than 20 health occupations. The occupational descriptions contain a brief discussion of the occupation, required aptitudes and skills, needed education, and opportunities for advancement. A list identifying sources of further information is provided. (SB)

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Health Careers guidebook

THIRD EDITION 1972

U. S. DEPARTMENT OF LABOR
Manpower Administration

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
National Institutes of Health

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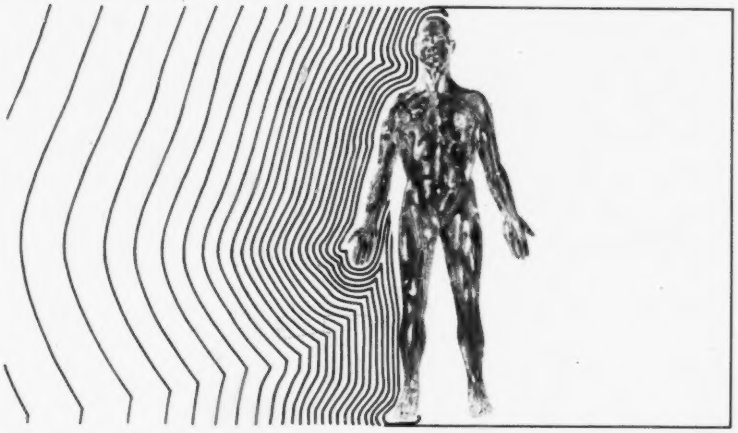
Health Careers guidebook

THIRD EDITION 1972



U.S. DEPARTMENT OF LABOR
James D. Hodgson, Secretary
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Prepared in Cooperation with the
NATIONAL HEALTH COUNCIL

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Since its introduction in 1955, the Health Careers Guidebook has been a valuable counseling resource for high school students, counselors, and management and personnel workers seeking information on occupations and careers in the health field. A second edition was required in 1965 because of the rapidly changing occupational picture; since then there have been even greater changes and advances in almost every occupation. Federal and private agencies interested in health manpower, recognizing the complexity and proliferation of occupations in the health area in particular, agreed that a new edition of the guidebook was needed.

The Manpower Administration of the U.S. Department of Labor and the National Institutes of Health of the U.S. Department of Health, Education, and Welfare joined forces, therefore, in a cooperative effort to produce a third edition. Merging the technical and informational resources of the two agencies has produced a document which we believe will be uniquely effective in providing current and accurate information on health careers. The National Health Council, a pioneer in the field of health careers for young people, has made a major contribution to the publication.

We believe this edition, like the other two, will provide information and encouragement to the student, his advisers, and others interested in health and health services in our Nation.

M R Lovell Jr.

Malcolm R. Lovell, Jr.
Assistant Secretary for Manpower
U.S. Department of Labor

Robert Q. Marston

Robert Q. Marston
Director, National Institutes of Health
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and Welfare

The U.S. Department of Labor's Manpower Administration and its affiliated State Employment Services have pioneered in the publication of occupational materials for use in the development and utilization of the Nation's work force.

In a society increasingly committed to the maintenance and improvement of the health of all citizens, the need for trained men and women in the health field is a continuing one. We are now confronted with severe shortages of qualified persons to serve this need.

The Health Careers Guidebook, developed and coordinated by the U.S. Employment Service, provides a major tool to supply the counselor, the student, and all other persons concerned with the health of the Nation with much needed information on performance requirements for health occupations, sources of financial aid, and community health training information

Paul J. Fasser Jr.

PAUL J. FASSER, JR.
Deputy Assistant Secretary
for Manpower and
Manpower Administrator

In the past 5 years there has been a virtual explosion in the health services field. This has come about because of the advances in medicine and science and because of a vastly increased demand. Medicare, Medicaid, and prepaid health insurance plans have created tens of millions of new consumers for health services. Government, industry, labor, social agencies, and others have assumed unprecedented initiative and responsibility for the delivery of medical care and health services and for the stimulation of consumer interest and demand.

One result has been a great increase in the need for health manpower within the already existing health occupations. Another has been the emergence of many new health occupations to conform with the new and highly specialized health services.

Years ago a student might have needed to decide whether to be a doctor, dentist, nurse, pharmacist, optometrist, podiatrist, etc. Today he has not 10 or 20 or 30, but hundreds of different health occupations from which to choose. The task of choosing a health occupation or of counseling a student in his choice has become quite complex and difficult.

In discharge of a traditional responsibility, the National Health Council has undertaken to provide guidance for the student, parent, and counselor.

In 1955 the Equitable Life Assurance Society of the United States made possible the National Health Council's first Health Careers Guidebook, which met a need for source information in compact form that was to be found in no other publication on health careers. Ten years later, in 1965, the U.S. Department of Labor revised, amplified, and republished the Guidebook.

Because the need for current information on health careers is so great, a new and third edition of the Health Careers Guidebook has been prepared. This has been a joint enterprise of the National Health Council, the Manpower Administration in the U.S. Department of Labor, and the National Institutes of Health in the U.S. Department of Health, Education, and Welfare.

We sincerely hope that this issue of the Health Careers Guidebook will be the key to a productive and satisfying career for many, many young people looking for a meaningful and useful place in life.

Richard P. McGrail

Richard P. McGrail
President, National Health Council

Acknowledgments

Recognizing the need for pertinent and topical health career information, the U.S. Employment Service, under the leadership of Robert J. Brown, Associate Manpower Administrator for the Employment Service, is appreciative of the opportunity to have worked with the cooperating agencies in the development of this document.

Direction and guidance for the publication of the third edition of the Health Careers Guidebook was provided by Leon Lewis, Chief, Division of Occupational Analysis, in the U.S. Employment Service of the Manpower Administration, U.S. Department of Labor.

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Major responsibility for the cooperative efforts of the Department of Health, Education, and Welfare, National Institutes of Health, was held by Joseph Kadish, Ed.D., Associate Director of the Division of Allied Health Manpower, and Mrs. Lucy M. Kramer, Program Analysis Officer, Division of Manpower Intelligence.

Major responsibility for the contribution of the National Health Council was held by Levitte Mendel, Associate Director, and Mrs. Kit Kolchin, Materials Consultant. Initial editing of the Guidebook was by Harry Milt, Editorial Consultant.

Appreciation is expressed to the Health Careers Guidebook Policy and Advisory Committees for providing broad coordination and planning as work on this Guidebook unfolded.

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Grateful acknowledgment is made to those agencies which reviewed the individual occupational descriptions to which their names are attached.

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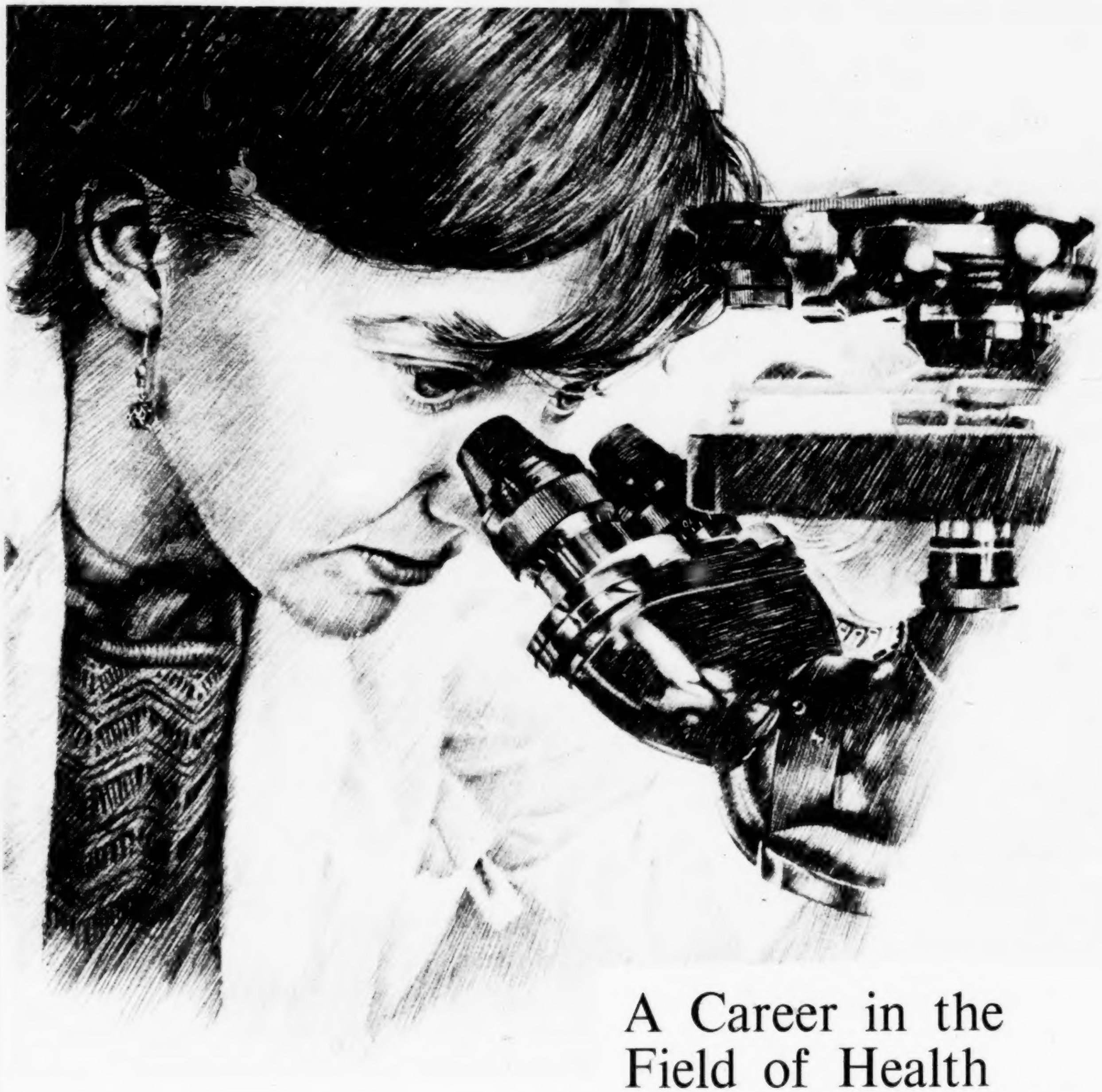


A Career in the Field of Health

Whether you want to start work right after high school or whether you're going in for more training, there's a place for you in the health field, if you want it and will work for it.

What this Guidebook does is give you the facts about health occupations and professions. There are hundreds of them. Some provide for the ill and injured; some help to safeguard health and prevent illness. In some health professions, you would be working with people in a busy place like a hospital; in others, with the materials and tools of science in the quiet of the laboratory. Some would take you into the home to work with the patient and his family. And still others might take you out to a farm or

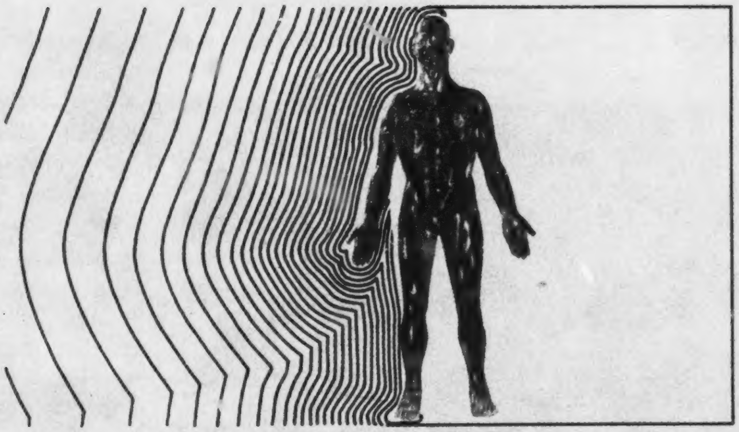
A child receives care from a physician and a professional nurse at an Indian medical center.

into a laboratory to work with animals.

For some health occupations, little training is required after graduation from high school. Others require a year or two in junior college, community college, or technical-vocational school. For many, 4 years of college is a necessity; others require an additional 1 to 4 years of graduate study (or even longer) beyond college.

But before you get down to particulars, you'll want some idea about whether you are interested in the health field at all. This Guidebook can help you do your exploring in this field. The first two chapters give you a brief overview of the health field itself—what to expect if you work in this field. This is followed by a chapter on career planning and preparation, including suggestions on education, and another on financial assistance.

Finally, there is the main section of the Guidebook. Here you will find a detailed description for each of several hundred different occupations—the kind of work entailed, the kind of situations in which you would be working, the kind and amount of education and training required, and the opportunities for advancement.



Unlimited Opportunities

The range of opportunities for a health career is vast, as you will see. There is a place in the field—

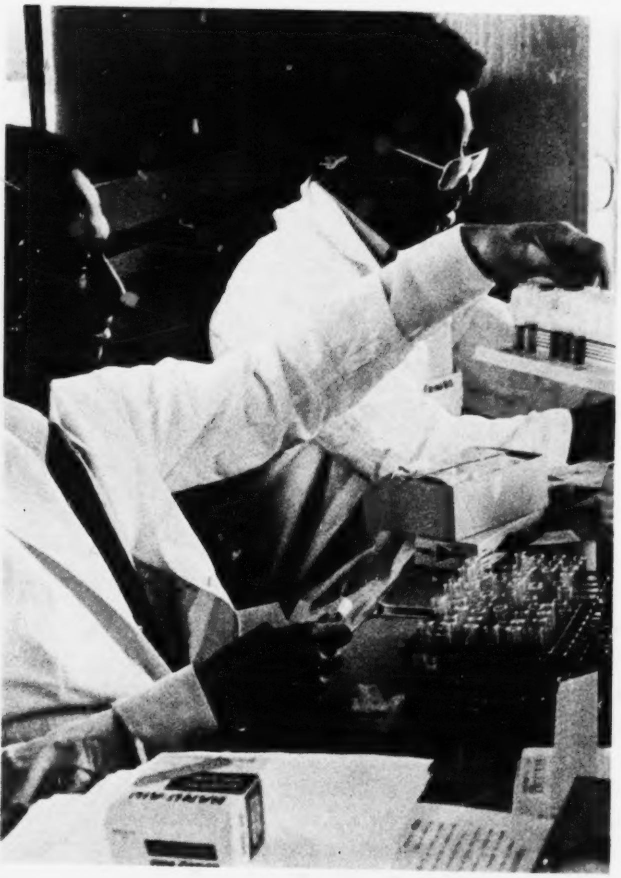
- for those who enjoy doing things with their hands, running machines, handling equipment;
- for the good mixer who likes to work with people and for those who have a special gift of sympathy and understanding;
- for the rugged individualist and for those who like to work entirely on their own;
- for the "genius" in math, science, psychology, and sociology;
- for those with the qualities of leadership and for the business-minded, the executive type;

- for those who have a flair for food or household management;
- for the profession-minded who want a career as physician, dentist, pharmacist, nurse;
- for the "born teacher" and good communicator—those who like to share ideas through the use of words in pictures, as in newspapers, magazines, films, or broadcasting;
- for the artist, illustrator, and photographer.

Out of every 100 health workers, physicians account for only nine. Another 18 are in medically related occupations; seven are in the dental professions and services; 50 in nursing; six in environmental health; and 10 in all other health occupations.

There is a tremendous need for more personnel in practically every health occupation and profession. Estimates show a need for 3,000 to 4,000 more occupational therapy personnel; 6,000 more in physical therapy; 25,000 to 30,000 more medical laboratory personnel; 10,000 more dietetic and nutritional personnel; 30,000 more dental auxiliaries; 20,000 more environmental health personnel; and 10,000 more medical record personnel.

Physicians take blood samples as part of a sickle cell anemia screening program.



In the professions requiring a baccalaureate degree, 78,000 more will be needed in 1975 and 93,000 by 1980, according to projections.

A number of "facts of life" must be taken into account in planning a career.

Young men need to take account of military service. For those planning a health career, this may be an opportunity rather than an interruption. The military services offer special training in many health occupations—training that can later be applied to preparation for a health career in civilian life. The military services and the U.S. Public Health Service also offer careers as commissioned officers for health professionals.

About 5 out of every 100 men in uniform, commissioned and enlisted, rate as medical personnel.

Young women want to take account of marriage and raising a family. There are any number of full-time occupations in the health field that do not interfere materially with these personal pursuits; in addition, there are numerous opportunities for part-time employment.

Health services can take you anywhere. You can stay in your hometown—work in a hospital or health department, or with the school health services or health services of a big business or trade union. You can work as a physician, dentist, pharmacist, optician, or in one of the many other professions engaged in private practice. In addition, you may find opportunities as an assistant to any one of these many professionals, or as a technologist or technician in a laboratory.

If you do not want to stay in your hometown or State, there is practically no limit on choices in any other part of the country, including, now, Alaska and Hawaii.

There are also numerous opportunities for American health workers abroad—teams of U.S. health personnel, working with the health services of other countries in wiping out typhoid, malaria, and

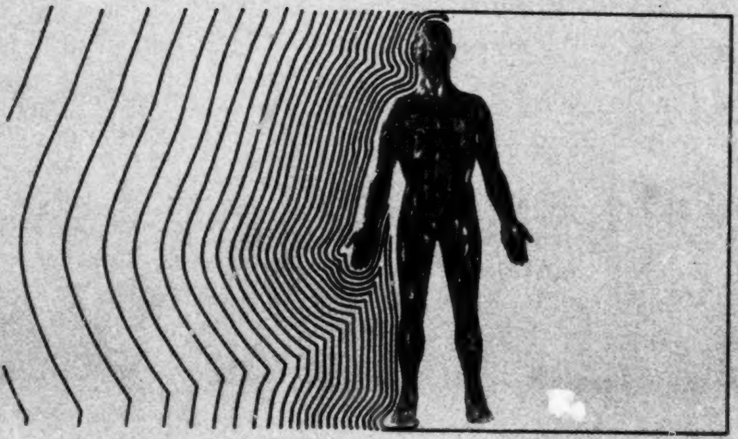
A surgical team performs an operation.

other diseases, or in establishing health stations or training health personnel.

The Peace Corps, the Public Health Service, the Agency for International Development, and the World Health Organization are just some of the agencies offering opportunities for health careers abroad.

When it comes to money, the health occupations professions compare well with others requiring equal education and training, and some rate considerably better.

The health services are one of the most actively expanding areas in American life, and the growth is expected to accelerate rather than slow down. Some 4 million people are in the health services today. By 1980 there are expected to be 6 million. Never before has there been as much emphasis on health services in Federal, State, and local planning and in business and industry.



An Overview of the Health Field

To give you an idea of what you can expect to find in the health field, or where you might work, the following pages describe the major types of health service organizations and facilities.

The Hospital

There are many different kinds of hospitals. Most familiar, perhaps, is the community hospital—the one you see in your own community, or nearby, where a relative, or you yourself, may have gone for an operation or other treatment. These are general hospitals, treating patients of all ages and with all kinds of illnesses and medical conditions. They are short-term hospitals; they deal with acute, short-term conditions and keep the patient an average of 7 days.

There are also chronic care, or long-term care, hospitals which treat patients with long-lasting or special conditions such as tuberculosis or mental illness. Some hospitals are organized to take patients only of certain ages, such as children. Hospitals range in size from as few as 25 beds to as many as 1,000 or more.

What the patient or visitor sees in a hospital is a smooth-running and reassuring combination of services and activities.

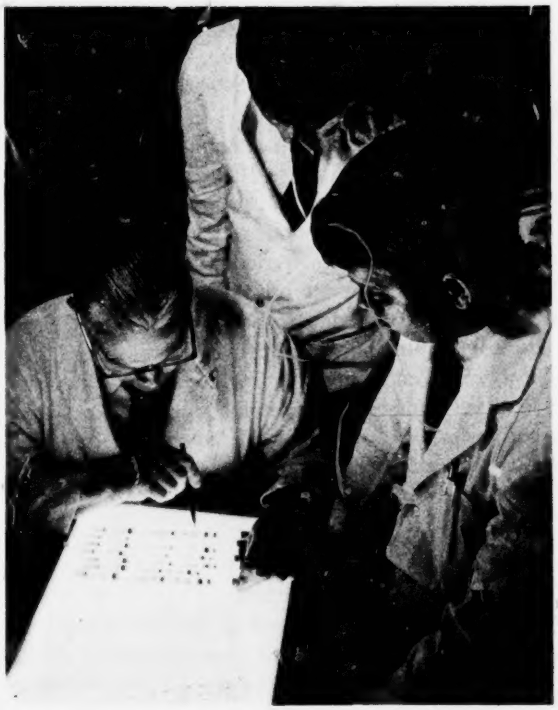
These are the patient services—those that constitute the main purpose of the hospital—the medical, surgical, and nursing services and the rehabilitation services including physical, vocational, occupational, recreational, and others.

But these "visible" patient services could not go on without the partnership and support of a host of behind-the-scene services: The pharmacy which prepares medications and fills prescriptions; the laboratory which analyzes the blood and tissue specimens; the dietetic services which prepare the three meals a day and special diets for patients with special conditions; the administrative service which "runs" the hospital, deals with finances, and employs, trains, and pays personnel; the clerical services which are part of the administration apparatus; the housekeeping, laundry, and many other services.

In addition to the patient services and supportive services, hospital functions also include research and professional training, community health education, preventive services, and so on.

The Community Health Department

As the official health agency for a particular city or county, the local health department is charged with protecting the community health through such measures as safeguarding the purity of food and water supply; promoting and providing innoculations for various diseases; controlling mosquitoes, vermin, rats, and other disease-carrying animals; controlling communicable diseases; controlling possible contamination or disease from sewage or air pollution; educating the public on disease control and health maintenance; providing maternal and child welfare clinics; providing some services for mental health and mental retardation.



The future lies with youth. Young scientists work with the more experienced to gain the expertise and insight so vital to future research.

In addition to these on-the-spot responsibilities, the local health department acts as a connecting link, relating local public health activities to those of the State health department, and through the State, to the U.S. Public Health Service.

Because its responsibility covers the entire community, the health department also serves as a center for health information and health education. It is the local outpost in the nationwide fact-gathering services through which health statistics are compiled. It also has the responsibility for keeping the local population informed about new health developments and encouraging them to use new services.

Behind these "visible" services (as in the hospital) are a host of behind-the-scene supportive services. One is the public health laboratory. Its activities include, for example, testing for the sources of communicable disease, traces of radiation, and causes of pollution in air, water, or food. In the larger health departments, the laboratories are also engaged in research.

In the local health department, many opportunities are open to physicians. They may serve as head of the department or of one of its various divisions. They may also be engaged as program directors or in clinical work. Other professional people essential to the public health service are dentists, nurses, veterinarians, sanitary engineers, sanitarians, statisticians, educators, nutritionists, information specialists, social workers, economists, and sociologists. There are also many classes of technologists engaged in the laboratories, in environmental services, and in the clinics. In addition, there are the administrative, clerical, and maintenance personnel.

Voluntary Health Agencies

Counting State and local as well as national organizations, we can number our voluntary health agencies by the thousands. You will find them in every part of the country. The names of the great national voluntary health agencies have, in fact, become household words, familiar everywhere—for example, the American National Red Cross, the National Tuberculosis Association, and the American Cancer Society, to name just a few. People who work in the health field join the voluntary health agencies as private citizens, but many professional health people join as working members.

Many kinds of health workers are needed because these voluntary organizations are concerned with nearly every kind of health service.

They identify and study health problems, in the Nation as a whole or in a particular area, and work out ways and means of meeting specific needs.

They alert the public to a particular health problem or group of related problems and try to keep people informed on what they can do to take individual action and to share in public action.

They help in making health services available when and where needed, particularly those services that would otherwise be difficult to come by because they are new or expensive or, possibly, some emergency situation is in danger of getting out of hand.

They take leadership in strengthening both professional education and research in the health field, and they provide essential financial support.

Finally, they are alert to identify health manpower needs. Many of them also take an active part in promoting community activities to bring health careers opportunities to the attention of young people.

The health workers that staff the voluntary agencies are diverse. What might be called the nucleus of the voluntary health agency team would include administrative specialists, public health educators, information specialists, health statisticians, and, in larger agencies, medical specialists, public health nurses, social workers, and people with a background in health economics or sociology.

Occupational Health

Some lines of business produce goods or services which have a direct effect on health and health protection—for example, the food industry, drug industry, or insurance companies offering policies to help pay medical and hospital care. Some are directly involved in environmental health problems affecting the entire community. But all share in responsibility for the health of the working people they employ. Services for this purpose—to protect and maintain the health of workers—are a basic concern in occupational health.

As the focal point for all its health protections, a good-sized business concern usually has its own health service. When you get a job, you would very likely be sent to this health unit or medical office for a physical examination. Through its health checkup services and by taking care of minor illnesses and accidents, the health unit provides an essential "ounce of prevention." But the physician and nurse who are responsible for these services must also be alert to deal promptly with more serious situations, such as accidents and other emergencies, as well as danger signals which suggest the possibility of serious illness.

Services like these represent the common denominator of occupational health—the protections needed wherever people work. But in addition, every occupation has its own particular risks—ranging from improper seating and lighting in the typing pool of a business office to the radiation hazards in uranium processing.

Along with increasing industrial hazards has come the increasing realization that many of these risks cannot be (or at least have not yet been) confined within factory walls. They literally spill over into the air and water, spreading exposure throughout their own and neighboring communities.

In recognition of this common concern, specialists working in these fields are grouped together in the Guidebook under Environmental Health Services. They include the industrial hygienist, radiological health specialist, safety engineer, sanitary engineer, and sanitarian.

Essential as their work is, it represents only one aspect of occupational health. The industrial physician and the industrial nurse are also members of this cooperative effort. Depending on the kind of industry, the size of the establishment, and similar considerations, many other health workers may also be involved—the dentist, the nutritionist and dietician, the public health educator, the many specialists associated with mental health or with rehabilitation.

School Health

School health covers a wide area. It is concerned with maintaining a safe and healthful school environment, and it must provide services to promote and protect the health of students. It is concerned with safety and sanitation, and whatever else is required to assure healthful surroundings for all kinds of school activities—in the classroom, laboratory, library, lunchroom, gymnasium, school grounds, and athletic field. It is concerned with preventing accidents and meeting health emergencies.

It takes responsibility for a variety of preventive and protective services—from checking on requirements about immunization against certain communicable diseases to the administering of sight and hearing tests. It is constantly on the alert, through the teachers and the school nurse, for the first sign that an individual student may be "coming down with something." It is also responsible for health education.

Supporting the teachers and principals in many school systems are school health specialists. Of these, school nurses are most familiar, but others would include school physicians, dietitians and nutritionists, school dentists and dental hygienists, psychologists, social workers, mental health specialists, and those who provide services for exceptional children. In the community at large, school health also has close cooperative relationships with all other health agencies as well as with parents' organizations and other community groups.

Mental Health

All of us have problems of emotional adjustment. For some people, such problems become overwhelming; those who are seriously ill often require professional treatment in specialized hospitals and centers or in general hospitals or similar community health facilities with mental health services. Mental illness is the general term describing psychiatric diseases or disorders which appear as personality problems and behavioral disorders, especially those involving the emotions.

Psychiatry, psychiatric nursing, psychiatric social work, and psychology are the major professional fields in mental health. Occupational therapists, other specialized therapists, and psychiatric aides round out the team. In addition, mental hospitals and community mental health centers need the same basic services as general hospitals; they call upon many members of the hospital team and many of its resources for treatment and care.

Thanks to new kinds of drug therapy and other improvements in treatment, the outlook for full or partial recovery from mental illness is more encouraging than it was even a few years ago, and rehabilitation of the mentally ill is getting increasing attention.

As important as treatment is research to find out what promotes mental health or causes mental illness. In some cases, mental illness has physical causes or associated conditions, but the findings of research put increasing emphasis on the importance of psychological and social sources of mental illness.

With increasing public understanding of mental health, cooperation is expanding, especially on the preventive side. Health departments, for example, are taking more and more responsibility for promoting mental health. The public health nurse can be particularly helpful, because she is in a position to spot early danger signs and many people count on her for advice. She can help them get needed care promptly; this can often head off serious problems, especially with children.

Mental illness remains one of our most serious health problems, and the great number of people who need long-term care is still a cause for concern. But in recent years there has also been a steady increase in the number of patients who can be treated successfully with medication and other means in the community and discharged from mental hospitals. Half-way houses help treat mental patients to adjust gradually to the world again.

Retardation

Mental retardation is entirely different from mental illness. It is caused by abnormalities of development that start before birth, or accidents that occur during and after birth, and the evidences of abnormality usually appear soon after the baby is born or in very early childhood. Mental retardation generally is evident while the child is still young; in contrast, mental illnesses may manifest themselves in both childhood and in adult life.

In the past, institutional care was practically the only organized provision for the retarded. But with today's new knowledge and new methods of treatment, community services can make it possible for all but the most seriously afflicted to remain in their own homes.

With early diagnosis, treatment, and training, most of retarded babies born every year could grow up to live satisfactory lives. Medical scientists have identified a few of the many causes of retardation and are working to develop methods of controlling or eradicating them. Now prevention is recognized as a possibility.

This broad approach—through prevention, diagnosis, treatment, and rehabilitation—calls for cooperation in one way or another by almost all the health professions. Among those most directly involved are such medical specialists as obstetricians and gynecologists, pediatricians, psychiatrists, neurosurgeons and neurologists, as well as psychologists, nurses, occupational therapists, physical therapists, speech pathologists, and medical social workers. All those who help to provide general medical and health care have a place here, too. The retarded are prone to the same kinds of health problems as other people—in some cases more so; the same causes that produce mental retardation may also cause associated physical handicaps. The family doctor, the pediatrician, the public health nurse, and the social worker have a special role as the advisers to whom parents are most likely to turn for the guidance and reassurance they are sure to need.

With increasing knowledge and experience, and with the expansion and strengthening of community services for the mentally retarded, new opportunities will continue to open up for many kinds of professional workers in the health field.

Rehabilitation

The purpose of rehabilitation is to help people disabled by illness or accident to make a place for themselves as workers and as useful family members and citizens. Accomplishing this requires a wide assortment of services. Medical care is needed to overcome or to compensate for the disability; training to prepare the individual for a suitable occupation, and, finally, guidance and assistance to help him get established in a job and keep it.

Providing the right combination of services is often a complicated task. The problems involved in rehabilitation have to do with every kind of disability—crippling diseases and accidents, disabling chronic conditions, like tuberculosis or heart disease, loss or limitation of sight, speech, and hearing, or mental illness.

Members of the rehabilitation services include not only the family physician, but many others: medical specialists and vocational rehabilitation counselors, occupational therapists, nurses, physical therapists, orthotists and prosthetists, psychologists, social workers, speech pathologists, and audiologists. Also, those who provide such services as consultation for disabled homemakers or specialized therapy: corrective therapists, educational therapists, homemaking rehabilitation, consultants, manual arts therapists, music therapists, and recreational therapists.

Even when rehabilitation services have done their part and the individual is ready to take his place in the world again, the rehabilitation task is not always completed. Workers may need training for a job where their disability will not be a handicap and their aptitudes can be applied to advantage. As allies in this part of its task, rehabilitation counts on teachers and employment specialists.

Recent years have brought far-reaching developments in rehabilitation. Throughout the country new rehabilitation centers are being opened—some connected with university medical centers or big hospitals, some with the military, and, others under the auspices of public or voluntary health agencies.

Research

Even in the basic sciences, research is not limited to the laboratory. An important part of the job must be done in the hospitals and other places where health services are provided. Many fields, as diverse as engineering, electronics (including automation), mathematics, psychology, the social and economic sciences, and public administration, are engaged in health-related research. All of these are adding to the store of what is known about health and are helping to translate this knowledge into increasingly effective health services.

Research is not the exclusive province of those specialists whom we identify as scientists. A current listing of organizations doing research to capitalize on emerging opportunities and explore new and different ideas in health-related sciences includes schools of medicine, dentistry, osteopathy, public health, pharmacy, nursing, and veterinary medicine.

Many different organizations are also involved in health research. Universities, especially those with strong programs in the health professions, are major health research centers. Such programs can draw upon all the university resources in the physical, biological, and social sciences as well as in medical and health practice. University teaching hospitals and other large hospitals are also involved. On public health problems, State health departments and some local health departments carry on a wide range of projects.

Although other Federal agencies—for example, the Atomic Energy Commission, the National Science Foundation, the National Aeronautics and Space Administration, the Defense Department, the Environmental Health Administration and the Food and Drug Administration, and the Veterans' Administration—also contribute to health research, the major Federal agency for such activities is the Public Health Service, operating mainly through the National Institutes of Health. In 1971 the United States spent $3 billion for medical research, of which two-thirds came from the Federal Government.

A scientist studies a section of cancerous tissue with the electron microscope.

For careers in which research is a major concern, see the sections on the following: Basic Sciences in the Health Field, Economic Research in the Health Field, Biomedical Engineering, and Sociology in the Health Field.

New and Emerging Health Occupations

Many "new" health occupations have emerged in the past few years. Some are already well established. Others are still taking shape, with job specifications, educational requirements, and training programs still to be worked out.

The term "new" is apt to be misleading. It may cover entirely new occupations such as "extracorporeal circulation specialist," or it may cover the offshoots of an existing occupation, as, for example, "physician's assistant." Sometimes it is difficult to draw a sharp line between "new" and "expanding," as in the case of "medical technologist" and "nuclear medical technologist."

Whatever the definition, there is no doubt that new occupational titles, new training programs in schools and hospitals, and new educational requirements all reflect the tremendous growth and activity

By supplementing their service-connected skills with additional training and instruction, returning medical corpsmen are finding new and satisfying careers in civilian life as physicians' assistants.

in the health field, and bring with them increased opportunities for a rewarding, secure, and expanding career in the health field.

Most of these new occupations are at the "aide," "assistant," and "technician" level—the allied health level, which represents some 85 percent of all health workers. The supportive health training programs are being offered mainly in junior colleges, community colleges, and vocational and technical schools, hospitals, health departments, and so forth. Others, at professional level, are given at colleges, universities, specialized schools, and others. Following is a list of some of the new or emerging health occupations that appear again and again in lists of education and training programs, of hospital personnel, of Federal, State, and local health department employees, etc.:

Allergy Environmentalist
Ambulance Emergency Technician
Biomedical Engineering Technician
Cardiovascular Technician
Child Health Associate
Computer Operator in Health Data
Dialysis Assistant
Dietetic Technician
Emergency Health Service Worker
Environmental Engineer/Scientist
Extracorporeal Circulation Specialist
Genetic Assistant
Geriatric Assistant
Intravenous Technician
Mental Health Worker
Nuclear Medicine Technician
Orthopedic Assistant
Physician's Assistant
Podiatric Assistant
Radiopharmacist
Social Rehabilitation Service Worker
Surgical Aide

New developments in the use of automation and electronics in the health field offer a view of the future. Scores of new occupations in the health field alone are expected to emerge within the next few years. Following are some of the developments:

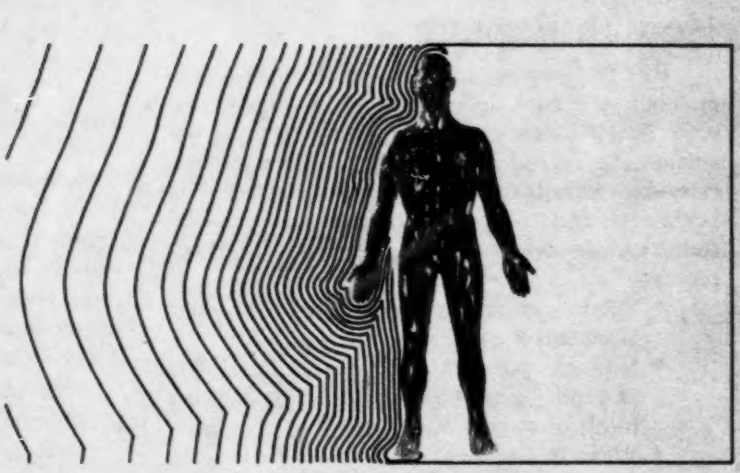
Computers have long been used in doctors' offices and in hospitals for billing, records, and so forth. But the extensive use of computers and electronic equipment in the field of health care, as such, is a comparatively new development and one that will bring with it not only better health care but new categories of jobs such as operation, maintenance, and repair of such equipment.

Monitoring consoles are being used that indicate the physical status of a patient—his heart beat, blood pressure, and other vital signs.

Automatic chemical analyzers are replacing manual techniques in the laboratory. In 1965, 25 to 50 percent of laboratory work was done by these instruments. By 1975 it is expected they will be doing at least 75 percent of the work. Almost 20 different tests can be carried out at one time, and the results entered automatically on a strip chart, with at least the same accuracy as manual analysis, much faster, and generally cheaper.

Electronic devices are being installed in hospitals to scan X-rays, enlarge them, read them, and convert them for storage and easy retrieval; to send images over wires for reading, thus enabling remote areas to benefit from expert medical advice.

Extracorporeal machines make it possible to treat patients with external equipment that takes over internal bodily functions, as, for example, dialysis machines for kidney malfunctions and cardiovascular machines for heart conditions and for surgery.



Career Planning

There are three main elements in career planning—information, counseling, and initiative. All are equally important and all are on tap as soon as you're ready to start.

1. Information—In the Health Occupation Descriptions section you will find descriptions of all kinds of professions and occupations in the health field. These give you enough information so that you can decide which careers seem most interesting to you and worth exploring further. A little later in this chapter there is a special section on How to Explore. Both in that section and in the individual descriptions, you will find suggestions about the kinds of additional information you will need and where you can get it.

2. Counseling—The assistance of an experi-

enced counselor may be your best help in exploring career prospects. The first place to go for this kind of help is the counseling service in your school or in your local public employment office. For some suggestions about other places where you might go for counseling services or for assistance from people representing the health careers in which you are interested, see the section on How to Explore.

3. Initiative—Though you need information and counseling, planning your career depends, first and last, on your own initiative. Finding out about careers, sorting out career choices, or making career decisions—these you must do for yourself.

How to Explore

The first step in exploring any career field is to pick out your most likely prospects. When you explore health career prospects, the Guidebook—including the individual occupational descriptions—can take you at least through this first big step. But neither this book nor any other single source of information can answer all your questions—for example:

- Where can you get the required training? What will it cost?
- How can you find out about the possibility of getting a scholarship? What about other forms of student assistance?
- What is the employment outlook in your community? or in your State? or throughout the country as a whole?
- Where can you get a chance to see what the people in these occupations—and their fellow workers in the health field—really do?

You may very likely think of other questions, too. Whatever they are, there are two general ways of getting them answered.

One is to write for published information—the career information pamphlets produced by the Federal Government and by national professional societies and other interested national organizations; the college and scholarship information published by some State education departments; or the catalogs of other student-guidance materials issued by colleges and professional schools.

The other way is to get in touch with well-informed local people and with local sources of information and guidance in your own community.

Career information from national organizations provides basic facts and serves as an essential background for local information and first-hand contacts with people and agencies in your own community. Many career pamphlets, each covering a particular occupation or group of related occupations, have been issued by professional societies and other national agencies in the health field.

The Referral List, which is found near the end of this Guidebook, identifies national organizations that can provide this kind of information on particular careers.

You can write for career information to any of the organizations included in the Referral List. But to make things easier for yourself—and the agencies—start by discussing the problems with your high school counselor, by looking around at school for the pamphlets you want, or by inquiring at your public library or from some of the other local sources mentioned below.

Counselors and teachers can give you additional information that will help to round out the Guidebook's overall picture. Just to give you an idea how many local sources of information you might possibly tap in addition to those in your own school, here is a checklist:

> the public employment office . . . the public library . . . your local health department . . . the community health council . . . the city or county medical or hospital association, and its women's auxiliary . . . other local professional societies and voluntary health agencies . . . neighboring hospitals and clinics . . . or any local counseling agency on the list of those approved by the American Board of Counseling Services, such as the B'nai B'rith Career and Counseling Service or that of the Urban League.

In many places health career committees or similar groups have been set up. Such groups sponsor or cooperate with the high school health career clubs that are a familiar student activity in many communities. In addition, they take part in school assemblies and career days and often put on other kinds of programs, such as health career exhibits at county fairs, tours of local hospitals or public health facilities, and visits to nearby professional schools.

Make the most of any such opportunity that comes your way.

Work experience is still another kind of career exploration. In some schools these work-experience programs are carried on through the school's health, or health career, clubs.

Probably most familiar are the student volunteer programs that bring young people into the hospital—to help and also to learn and observe what all the different people on a hospital staff actually do. Some health departments and voluntary health agencies have similar provisions for high school students to do regular volunteer work.

Opportunities for student employment, either in the summer or out of school hours, are also available in some places. Schools and colleges often cooperate with hospitals, local health departments, or voluntary health agencies to offer vacation or part-time student jobs.

Still another kind of work experience is provided by summer traineeships sponsored by various organizations. Many of these are in science and offer laboratory experience for students whose schoolwork demonstrates interest and capacity.

Education – What Kind and How Much?

For a broad-scale view of training time, consult the Health Careers Calendar. A quick look will show the wide range in the amount of training time required for different health occupations. Nevertheless, there are several fairly clear-cut groupings as to training-time requirements.

No academic training beyond high school is needed for some kinds of health work; these occupations offer jobs for high school graduates who want to go to work right away.

A few of these occupations require no special training—as, for example, laboratory helper.

Others require a kind of training offered in many high schools and vocational schools—office skills or industrial arts, for instance.

Also, some high schools and vocational schools offer more specialized training for certain health occupations—notably for practical nursing. (These practical nursing courses include supervised practical experience, combining hospital training with an academic study program in the school.) Other health occupations for which certain high schools provide training courses are nurse aides, dental assistants, and institutional food service workers.

For still other occupations, a training period may be required after employment starts. Hospital orderlies and opticians are among those who ordinarily begin as on-the-job trainees. In some cases, on-the-job training may extend over quite a long period. Opticians, for example, spend several years as apprentices before becoming fully qualified.

Occupations requiring not more than 3 years of special training after high school graduation represent an important group of health careers.

Some kinds of professional nursing education come within this group—the 3-year diploma program and the 2-year associate program. Also included are such varied occupations as, for example, the cytotechnologist, the electronics technician, and the medical assistant in a doctor's office. Many hospitals have nursing schools, and some also provide training in other health occupations.

Four years of college and a bachelor's degree represent the basic educational requirements in some health professions—for example, the baccalaureate nursing program, the physical therapist, or the sanitarian. For some occupations in this group, a year's internship may follow college graduation—for example, the child health associate or the medical record administrator.

For certain health careers, you need at least 5 years of combined college and professional training before you are ready to make a start—for example, the pharmacist, speech pathologist, or occupational therapist.

Still more extensive professional training is required in medicine, dentistry, and some other health careers.

In medicine, for example, it takes at least 4 years of study after college to meet minimum requirements; ordinarily this starts immediately after college graduation and is generally followed by an internship.

How Much Does It Cost?

Education costs per year vary depending on the type of occupation, the kind of school, the part of the country in which it is located, the availability of loans and scholarships, the financial support by the government, and the changes in tuition and so on that are likely to be made from year to year.

Because of these variables, it is impossible to put an exact "price tag"—one that would apply everywhere and to everyone—on training costs even for a particular kind of occupation like nursing or dentistry. What can be done is to point out some of the variables, so that you can take them into account in making your own plans.

Whether you are planning on a 2- or 3-year course or the full 4 years of college, the most economical way to get your professional training is to live at home and go to a nearby institution. Some local hospitals have training programs for personnel they need—for example, medical and X-ray technician—at no cost to the student. Aside from tuition, your main expenses will be books and laboratory fees. If you go to a college under your local or State public education system, tuition is likely to be more moderate than in a privately supported college. This difference also applies as between public and private junior colleges or other institutions offering less than 4-year college training. (In some parts of the country, publicly supported junior colleges may charge little or no tuition.)

If you are going away to college, variables that you will want to take into account include: differences in tuition (if you go to a State university in your home State, the cost will probably be less than a State university elsewhere or in a private college or university); whether you go far from home, so that travel becomes a big item; what the cost is for dormitory or other living arrangements; what amount the college advises you to allow for books, laboratory, and other college fees and for general expenses. Be sure to check on all of these items in the catalogs of the colleges in which you are interested—and be sure the catalogs are up to date.

If you are looking ahead to one of the health professions that requires graduate training after college, you will have to extend the time factor in your cost estimate, and the annual cost in a professional or graduate school may also be higher than that for your college years. When you try to figure all this up ahead of time, the cost may seem prohibitive. But don't be discouraged until you find out more about it and have a better idea of what your prospects would be.

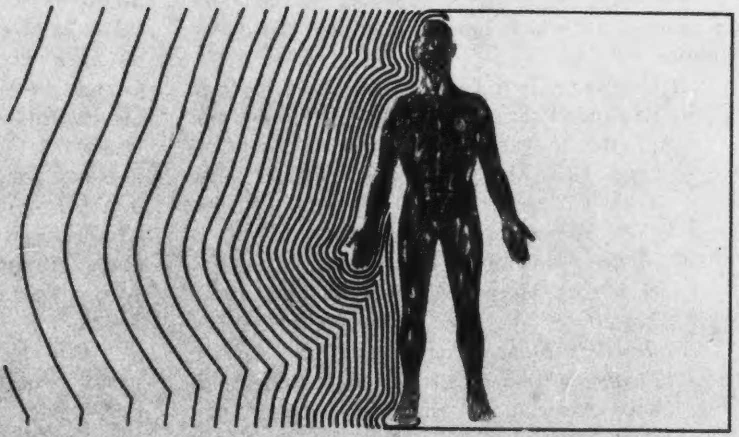
To ascertain the facts on actual cost get catalogs from the schools that seem most promising—in location, size, and courses offered, as well as in tuition and other costs. Ask also for the special pamphlets issued by many colleges on their student aid program—scholarships, loans, and so on. (Ordinarily these materials are available free on request.) By getting information on a number of different schools, you probably will find that you have a choice as to where to apply. And in making application, line up several alternatives. If at all possible, it's better not to pin all your hopes to a single school.

With detailed information from the catalogs, you can get down to brass tacks—adding up tuition, local transportation or away-from-home travel, and other items of expense, and comparing the totals for each school.

Next, make an inventory of your potential resources. One of these potentials may be a scholarship or some other form of student aid. But before you get to that, you will need to estimate how much of the cost you can meet without turning to outside help.

What share of the cost can come out of family resources or from your own savings?

What can you count on earning during your college years? (Many colleges report that at least 3 out of 4 students pay for part of their expenses out of their own wages from summer or part-time jobs.)



Financial Aid

Lack of funds need not prevent a student from obtaining the necessary education or a career in the health field.

A student's ability and financial need may make him eligible for full or partial scholarships, grants-in-aid, loans, or part-time work programs. These types of financial assistance may be combined or packaged. For example, a partial scholarship might be combined with a loan and/or part-time employment. In this way it is possible for a student to finance the total cost of his education.

Financial aid is available through numerous sources. The range of aid available and some of the main sources of this aid are described and identified below. This is certainly not intended to be an all-inclusive listing. For complete detailed information about specific scholarships and financial aid including eligibility requirements, and where and when to apply for such aid, students are urged to consult their high school guidance counselor, financial aid officer, or admissions counselor from the college of their choice. Information can also be requested from State and metropolitan health career programs. A listing of these offices appears at the end of this section.

At the end of each occupation description in the Guidebook are the names and addresses of authoritative professional organizations. These organizations can be contacted for information about the availability of financial aid for persons interested in entering the particular occupation.

Following are some recommended source books on financial aid which can be found in most public libraries.

A Chance to Go to College. New York: College Entrance Examination Board, 1971, 248 pp.

"A Letter to Parents: Financial Aid for College, 1970-71." Margolius, Sidney. New York: College Entrance Examination Board, 1970, 10 pp.

Complete Planning for College. Sulkin, Sidney. New York, Harper & Row, Publishers, 1968, 324 pp.

Counselor's Manual for: How About College Financing? American Personnel and Guidance Association, American School Counselor Association, 1607 New Hampshire Avenue, N.W., Washington, D.C. 20009. 1968. Feingold, S. Norman, (Ed.).

Financial Aid for Higher Education. U.S. Office of Education, Washington, D.C.: Government Printing Office, 1968, 110 pp.

"Need a Lift? Educational Opportunities." American Legion Education and Scholarship Program. Indianapolis: Revised annually.

How to Earn Money in College. Cambridge, Mass.: Harvard Student Agencies, Inc., 1968, 238 pp.

Scholarships and Grants for Education

Some scholarships and grants are awarded to students on the basis of ability and/or need. Others are earmarked for students studying for careers in the health field.

Almost all private colleges offer partial and full scholarships to outstanding students depending on the extent of their need. Many schools consider need and potential as important a factor in awarding a scholarship as high test scores and a top academic record. Students should request scholarship information at the time they apply for admission to the schools of their choice. Both the student and his parents should expect to complete financial aid application forms provided by the college or high school. This application usually entitles the student to consideration for all types of financial aid.

The Federal Government and many States award merit scholarships to promising students on the basis of examinations taken during the last year of high school. Through Economic Opportunity Grants, the Federal Government encourages promising students with exceptional financial need to continue their education in college. The Government also has grants for certain children of deceased or disabled veterans and for young people who previously received social security benefits. The GI bill offers educational assistance to veterans of the Armed Forces honorably discharged after January 31, 1955.

Private, State, and national medical and allied health associations and societies offer full and partial scholarships and grants for individuals planning to enter their particular occupational field. Hospitals, hospital auxiliaries, private industry, labor unions, local religious organizations, civic and special interest groups all grant varying amounts of scholarship aid.

Educational Loans

High school graduates who have been accepted for enrollment or college students enrolled in full-time degree programs or at least half-time degree programs and who need financial aid to meet educational expenses are eligible for NDEA (National Defense Education Act) loans. An undergraduate may borrow up to $1,000 annually. The repayment of principal and interest begins 9 months after the student ends his studies. At this time, a 3 percent interest charge is applied to the unpaid balance until the loan is repaid.

Many States have higher education guaranteed loans for State residents in full-time or half-time degree programs who have the ability and desire to gain a higher education but lack the funds to enter into or continue such a program. These funds are borrowed from a participating State lending institution (banks, etc.). Again, repayment begins within 9 months of termination of study. Payments may be spread over a period as long as 10 years. The student begins paying the interest after termination of study. Interest rates vary.

Part-Time Employment

Students who need a job to help pay for college expenses are eligible for employment under federally supported work-study programs which permit students to work on campus or in nonprofit organizations up to 15 hours a week while in school and up to 40 hours during vacation.

Most schools and colleges have placement services to help students find part-time jobs in the community. Many of the schools themselves need capable employees either part time or full time. Most colleges have tuition remission plans for full-time employees which permit the employee to attend evening school and take a limited number of courses free of charge.

Graduate Training Prospects

If you are considering a health career that requires at least baccalaureate or graduate training, you will be encouraged to know that the prospects of getting needed financial help are good and may be even better by the time you are actually ready to undertake this advanced training. As that time gets nearer—say by your junior year in college—you will be in a better position than you are now for intensive exploration. Meantime, however, a general view of the present situation may give you some idea of what may lie ahead.

One of the most important developments is the Federal program which enables professional schools in medicine, osteopathy, dentistry, nursing, pharmacy, optometry, podiatry, or veterinary medicine to provide low-interest loans for their students. This program was continued and enlarged under the Comprehensive Health Manpower Training Act of 1971 (P.L. 92-157) and the Nurse Training Act of 1971 (P.L. 92-158). This program alone did not meet the entire need. Through the Health Training Improvement Act of 1970 (P.L. 91-519), other health professions, some of less than baccalaureate level, are now able to get financial assistance for advanced traineeships. These professions and occupations, covering 21 categories, include medical and X-ray technologists, dietitians, and technicians and technologists at all levels.

Loans under the National Defense Education Act program or from the other sources cited above are a resource for many graduate, as well as undergraduate, students.

Grants are also available for graduate study in a number of specialties such as public health, mental health, rehabilitation, and nursing education. Often called fellowships, such grants are really scholarships under another name. The Federal Government finances many such fellowships. Some are supported directly by the universities where they are offered; others are provided through funds from foundations, voluntary health agencies, or industries, and in some States by the State government.

The Forgiveness Clause

Under recent legislation, the "forgiveness" clause for those who borrow from the Federal Government to get an education in health occupations has been extended to include not only physicians, dentists, nurses, and osteopaths, but also veterinarians, pharmacists, podiatrists, and optometrists. This clause provides that a certain percentage of the loan is forgiven for those who agree to work in designated shortage areas for a specific period of time.

This is one way in which areas deprived of health manpower can be served, and the scarce supply of trained health manpower can be more equitably distributed.

General Federal Support

The Federal Government has more than 150 programs that support health manpower training, and the number and kind is constantly increasing: training on the job, continuing education at all levels, training that leads to a diploma or an associate, a baccalaureate, a master's, and even a doctoral degree. The training period under Federal support may vary from a few days to several years.

Grants are made to States, to communities, to schools, to public or private nonprofit agencies, or directly to individuals to help meet ever-increasing requirements for health manpower.

Local Health Careers Programs

Additional information on financing may be obtained from the following organizations:

ALABAMA

Miss B. Parnell Langston, Director
Health Careers Council of Alabama
901 South 18 Street
Birmingham, Alabama 35205

ALASKA

Marion K. Lampman, Executive Director
Alaska State Hospital Association
1135 W. 8th - Suite 3
Anchorage, Alaska 99501

ARIZONA

William E. Smith, Assistant Executive Director
Arizona Hospital Association
635 West Indian School Road
Phoenix, Arizona 85013

ARKANSAS

Gary D. Hughes, Director
Health Careers Program
Arkansas Hospital Association
P. O. Box 2181
Little Rock, Arkansas 72203

CALIFORNIA

Kenneth L. Briney, Ph. D.
Executive Director
Health Manpower Council of California
One Camino Sobrante
Orinda, California 94563

Mrs. Barbara de Cordova
Project Director, Health Careers Program
National Medical Association Foundation
1635 E. 103 Street
Los Angeles, California 90002

Irwin Staller
Health Professions Council of San Francisco
1487 Fourth Avenue
San Francisco, California 94122

Frank St. Denis
Assistant Executive Director
Hospital Council of Southern California
4777 Sunset Boulevard
Los Angeles, California 90027

CANADA

Mrs. Norma Clark
Hospital Careers Consultant
Ontario Hospital Association
24 Ferrand Drive
Don Mills, 402, Ontario

R. K. Ksionzyk
Coordinator of Information Services
Manitoba Hospital Association
377 Colony Street
Winnipeg, 2, Manitoba

Pierre Ledoux, Director
Education Service
L'Association Des Hopitaux de la Province de Quebec
505 oest, boul Dorchester 1202
Montreal, 128, Quebec

Jessie McKay
Alberta Hospital Association
2108 A Street, N. W.
Calgary, 61, Alberta

COLORADO

George H. Cowen, Jr.
Associate Director
Colorado Hospital Association
3150 East Third Avenue
Denver, Colorado 80206

Mrs. Jo Messlin, Executive Director
Colorado Health Careers Council, Inc.
1809 East 18 Avenue
Denver, Colorado 80218

CONNECTICUT

Herbert A. Anderson, Executive Vice President
Connecticut Hospital Association
P. O. Box 1966
New Haven, Connecticut 06509

DELAWARE

John E. Crocenzi
Director of Health Manpower
Association of Delaware Hospitals, Inc.
1401 Pennsylvania Avenue
Wilmington, Delaware 19806

DISTRICT OF COLUMBIA

Mrs. Beecher T. Cassells
Project Director, Health Careers Program
National Medical Association Foundation
1013 12th Street, N. W.
Washington, D. C. 20005

Gilbert E. Smith, Ph. D.
Assistant Executive Director
Hospital Council of the National Capital Area
1812 K Street, N.W.
Washington, D. C. 20006

FLORIDA

Mrs. Beverly Conner, Coordinator
Hospital-Health Careers
South Florida Hospital Association
Two Coral Way
Miami, Florida 33131

Wade H. Edwards, Public Relations Director
Florida Hospital Association
P. O. Box 6905
Orlando, Florida 32803

Manuel Valles, Executive Director
Florida Health Manpower Council
One Davis Boulevard
Davis Island
Tampa, Florida 33606

GEORGIA

Mrs. Pat Malone, Director
Georgia State Scholarship Commission
100 Mitchell Street, S. W.
Atlanta, Georgia 30303

Miss Betty Merritt, Executive Secretary
Health Careers Council of Georgia, Inc.
P. O. Box 151
St. Joseph's Infirmary
Atlanta, Georgia 30303

HAWAII

Ollie Burkett
Executive Director
Hospital Association of Hawaii
200 N. Vineyard Boulevard, Suite 507
Honolulu, Hawaii 96817

IDAHO

John D. Hutchinson, Executive Director
Idaho Hospital Association
P. O. Box 7482
Boise, Idaho 83707

ILLINOIS

Donald C. Frey, Executive Director
Health Careers Council of Illinois
410 North Michigan Avenue
Chicago, Illinois 60611

INDIANA

Mrs. Jan Davidson, Executive Director
Indiana Health Careers, Inc.
2905 North Meridian
Indianapolis, Indiana 46208

IOWA

H. Mel Willits, Director
Health Manpower and Public Affairs
Iowa Hospital Association
1906 Ingersoll Avenue
Des Moines, Iowa 50309

KANSAS

Larry K. Schaffer, Director of Education
Kansas Hospital Association
P. O. Box 417
Topeka, Kansas 66601

KENTUCKY

Robert C. Wheeler, Program Coordinator
Health Careers in Kentucky
1415 Saint Anthony Place
Louisville, Kentucky 40204

LOUISIANA

Carl L. Little, Director
Health Careers Development Program
Louisiana Hospital Association
P. O. Box 53352
New Orleans, Louisiana 70150

MAINE

Peter C. Doran, Ph. D.
Executive Director
Health Council of Maine
133 State Street
Augusta, Maine 04330

MARYLAND

John F. Bacon, Executive Director
Maryland Hospital Education and Research
Foundation
1301 York Road
Lutherville, Maryland 21093

MASSACHUSETTS

Irl Lucas, Executive Director
Massachusetts Health Careers Council
c/o Massachusetts Heart Association, Inc.
85 Devonshire Street
Boston, Massachusetts 02109

Joseph W. Tamburino, Manager
Personnel Services
Massachusetts Hospital Association
5 New England Executive Park
Burlington, Massachusetts 01803

MICHIGAN

Roger M. Busfield, Jr., Ph. D.
Associate Director
Michigan Hospital Association
2213 East Grand River Avenue
Lansing, Michigan 48912

John A. Doherty, Executive Vice President
Michigan Health Council
P. O. Box 1010
East Lansing, Michigan 48823

Mrs. N. S. McLellan, Coordinator
Health Careers Council of Calhoun County
252 Beckwith Drive
Battle Creek, Michigan 49015

Miss Patricia O'Malley
Health Manpower Council of Southeast
Michigan
United Community Services of Metropolitan
Detroit
51 West Warren Avenue
Detroit, Michigan 48201

MINNESOTA

Mrs. Mildred K. Brown, Director
Manpower, Training and Education
Twin City Hospital Association
2329 University Avenue, S.E.
Minneapolis, Minnesota 55414

John Koprowski, Project Director
Minnesota Health Careers Council
2333 University Avenue, S. E.
Minneapolis, Minnesota 55414

MISSISSIPPI

Mrs. Irene Snipes, Planning Assistant
Health Manpower Recruitment Program
Mississippi Hospital Association
4880 McWillie Circle
Jackson, Mississippi 39206

MISSOURI

Don Butzer, Project Director
Missouri Health Careers Program
P. O. Box 1044
Jefferson City, Missouri 65101

Mrs. Ruth Dunham Dodge
Missouri Health Careers Program
c/o Washington University Medical
School and Associated Hospitals
660 South Euclid Avenue
St. Louis, Missouri 63110

MONTANA

William E. Leary, Executive Director
Montana Hospital Association
P. O. Box 543
Helena, Montana 59601

NEBRASKA

William Schellpeper, Chairman
Health Careers
Nebraska Inter-Agency Health Planning
c/o Nebraska State Medical Association
1902 First National Bank Building
Lincoln, Nebraska 68508

NEVADA

John J. McEvoy, Director
Health Careers Program
Nevada Hospital Association
3660 Baker Lane
Reno, Nevada 89502

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HEALTH CAREERS CALENDAR

THIS CALENDAR gives you a quick check on how many years of education, after high school, you should count on for the representative health occupations listed here.• The lines and symbols show what is customary–some people take only minimum required training; many take more.

● Requires no special training.

●┅┅┅ Entails an apprenticeship, special course, or on-the-job training.

▬▬▬ Requires special training in college, in a hospital or special school, or in a professional school after 1 to 4 years of college.

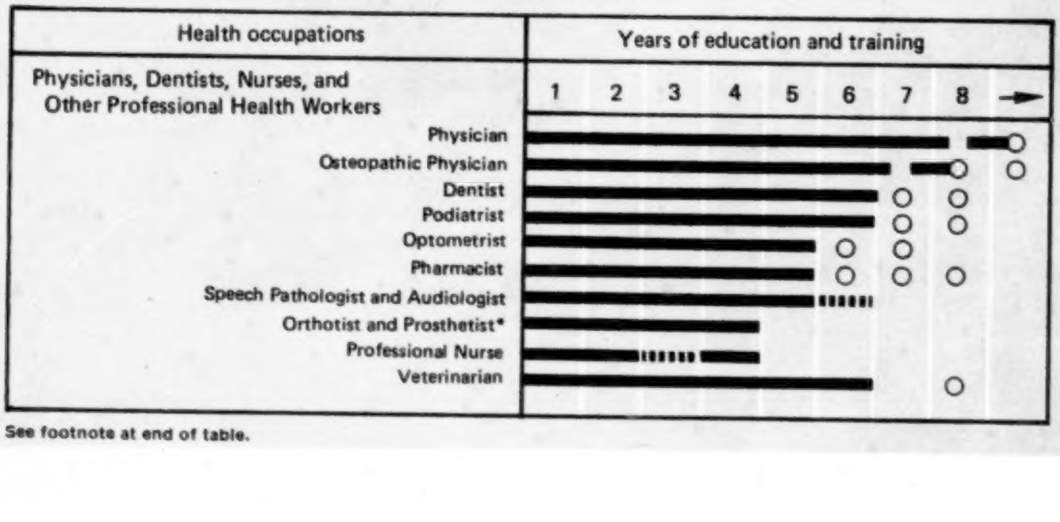
○ Though the line shows the minimum period to qualify, more preprofessional years in college lengthen the total training time.

☐ First square means one can get a junior professional job after college. Subsequent squares indicate that more study–to or beyond the master's or doctor's degree–as well as experience is usually needed for advancement.

▬▬┅┅ Requires special training of varying periods of time.

This calendar pictures training information in condensed timetable form. To get a more detailed picture, read the *Health Careers Guidebook* Occupational Descriptions and consult your school advisers for information and personal guidance on training and the local outlook for the career you want.

YEARS OF EDUCATION AND TRAINING BEYOND HIGH SCHOOL FOR CAREERS IN SELECTED HEALTH OCCUPATIONS



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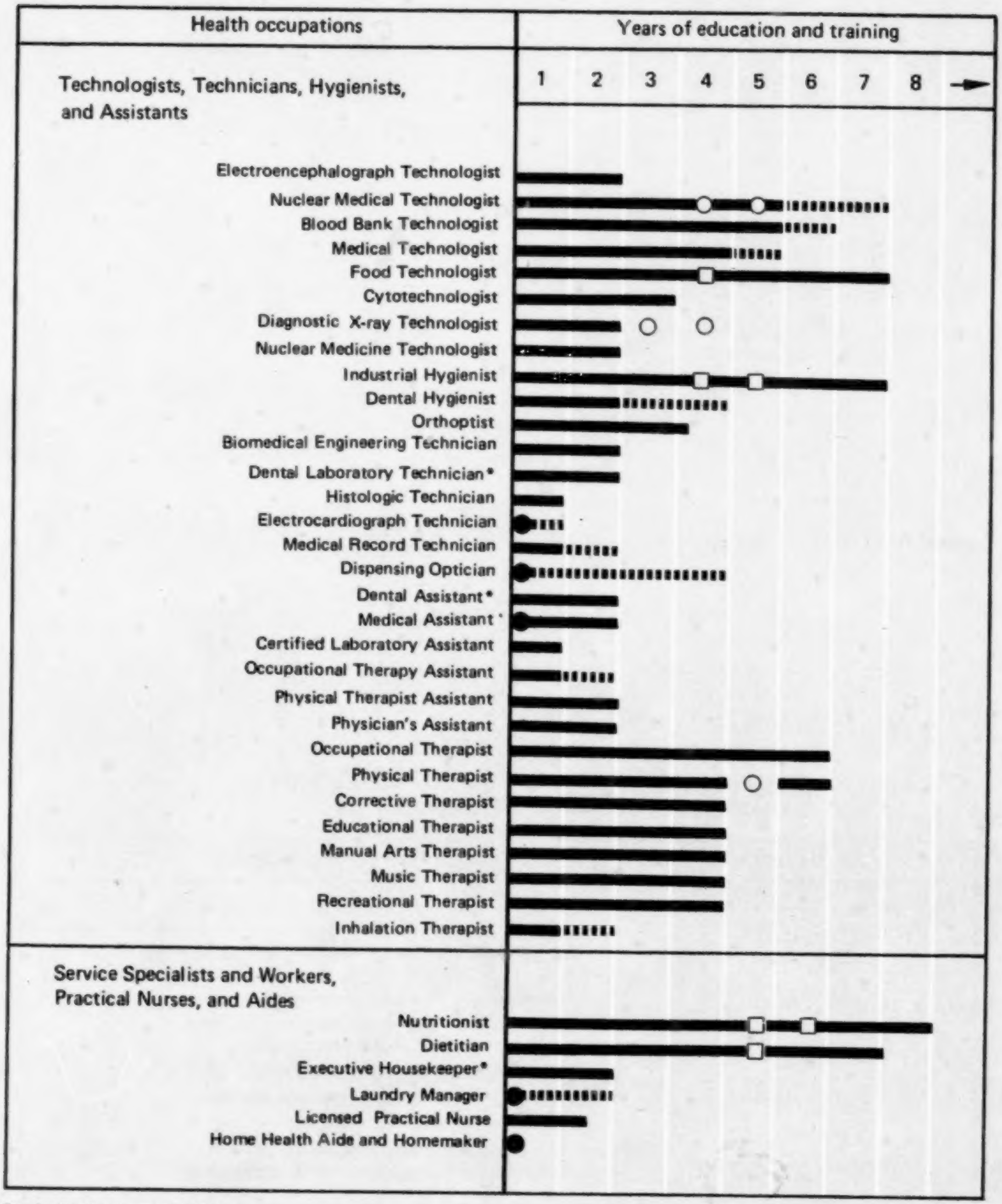
YEARS OF EDUCATION AND TRAINING BEYOND HIGH SCHOOL FOR CAREERS IN SELECTED HEALTH OCCUPATIONS --Continued



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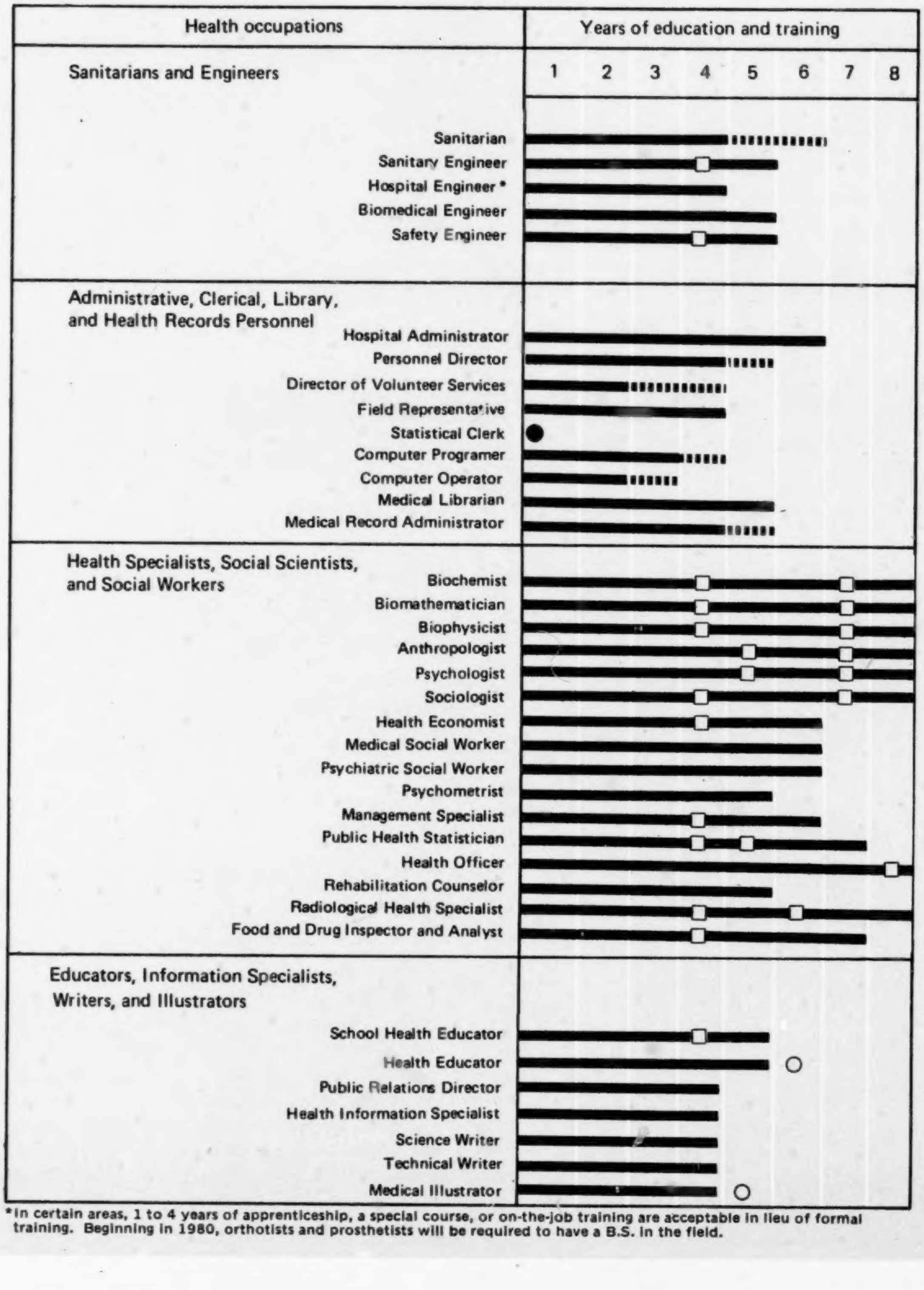
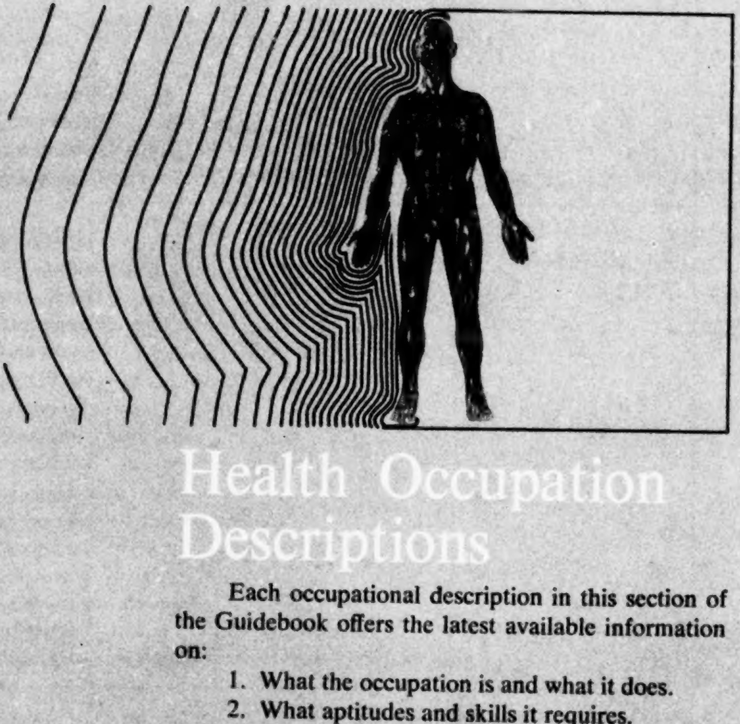
YEARS OF EDUCATION AND TRAINING BEYOND HIGH SCHOOL FOR CAREERS IN SELECTED HEALTH OCCUPATIONS --Continued



*In certain areas, 1 to 4 years of apprenticeship, a special course, or on-the-job training are acceptable in lieu of formal training. Beginning in 1980, orthotists and prosthetists will be required to have a B.S. in the field.



Health Occupation Descriptions

Each occupational description in this section of the Guidebook offers the latest available information on:

1. What the occupation is and what it does.
2. What aptitudes and skills it requires.
3. What kind of education is needed to prepare for this occupation and how long the training takes.
4. What the opportunities are for advancement.

The information for each occupational description has been supplied by authoritative sources, either a professional society or some other representative organization. The name and address of each responsible organization will be listed at the end of each description so that the reader may send for additional information on the occupation itself, requirements, training, or sources of financial aid.

With only a few exceptions, the occupations covered in the descriptions are coded according to the occupational code structure found in the Dictionary of Occupational Titles.[1] In each instance, these code numbers are cited at the end of the occupational description. The code numbers are intended for technical use by the counselor or other professionals engaged in counseling and placement work.

Basic Sciences in the Health Field

Without the basic sciences, we could not treat or prevent illness or preserve health.

Research in the basic sciences provides medical science and the practicing physician with essential knowledge about the body's functioning, in health and disease. It also provides the doctor with the drugs, radiation, and other devices he uses in detecting, diagnosing, treating, and preventing disease.

The student who has an interest in biology, chemistry, physics, or mathematics, and who would like to develop this interest into a career in health, has a wide field from which to choose. Many branches of biological, chemical, and physical science have a direct or indirect application to medical research. Following are brief descriptions of a number of these.

Anatomy and physiology provide knowledge about the structure and functioning of the different parts of the body and the illnesses which occur when a particular organ or system (circulatory, digestive, respiratory, or other) does not function properly.

Biochemistry takes the functioning of the cell down to its most fundamental aspects—the chemical processes which go into the cell's nutrition, growth, and reproduction. It tells us how these processes are disturbed by various illnesses, and reveals how these disturbances might be corrected.

The entire field of nutrition—balanced diets, vitamins, chemical elements in the diet, such as iron, calcium, and potassium, and nutritional illnesses, such as rickets, scurvy, pellagra—depends on the basic knowledge of the cell's nutritional requirements. This knowledge comes from cell biology and biochemistry.

Bacteriology and microbiology deal with the microscopic organisms that invade the body and cause illness.

Genetics is concerned with heredity, and as applied to health it probes into the hereditary aspects of such illnesses as sickle cell anemia, diabetes, epilepsy, rheumatic fever, heart disease.

The entomologist and parasitologist would be concerned with the disease-causing insects or animal parasites.

The poisonous effects of some drugs in the various tissues and organs of the body come under the interests of the pharmacologist and biochemist, as do the healing and curative effects of other drugs and medications.

Virologists study the submicroscopic particles known as viruses—how they originate, how they grow and multiply, and how they affect living tissue and living organisms. But virologists are particularly interested in the disease-causing viruses (those, for example, that cause polio, mononucleosis, influenza, measles) and the preparation of vaccines against these viruses.

The endocrinologist studies the body's glands and glandular secretions (adrenal, pituitary, thyroid, sex glands, etc.), and the illnesses resulting from glandular disorders.

The hematologist specializes in the blood and blood-forming organs, and the diseases associated with blood disorders (such as anemia and leukemia). The serologist analyzes the natural disease-fighting properties of the blood.

Biophysicists are concerned with the way the body creates and uses energy; now nerve impulses are transmitted through various parts of the nervous system; how the eyes and ears receive and transmit light and sound waves; how the muscle fibre responds under various conditions; and the neurological processes which go on in thinking, memory, feeling, and so forth.

The biophysicist would do research, also, on the functioning of the human heart and the mechanics of the circulatory system. As members of the health science research team, biophysicists are also working with complex tools like particle accelerators, or with others as simple as a magnet, to employ basic forces of nature for a variety of purposes: providing pacemakers, artificial kidneys, mechanical heart-valves, and other devices for organs damaged by disease or injury; devising new surgical techniques; devising new types of radiological equipment.

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[1] Published by the U.S. Department of Labor. Third edition, 1965.

Specialized areas of biophysics are radiological physics (the effects of radiation on living structures and tissues and their potential benefits or hazards); cryogenics (the low-temperature physics); hydrostatics (the physics of liquids).

Biomathematics—the application of mathematical principles to the life sciences—was almost undreamed of 10 years ago. Yet today biomathematicians are building "mathematical models" to explain life processes that cannot be demonstrated efficiently in the laboratory. They are predicting the presence of unseen substances and their relationships with living tissues to provide other bioscientists, such as epidemiologists, who study the origin and incidence of disease, with concepts and clues with which they may eventually be able to locate and identify these unknowns. (The application of computers to biomedical research has also opened up new opportunities for young people interested in mathematics. See the section on Biomedical Engineering.)

Research Cooperation

In the health field, the relationship between basic research and clinical research is paramount, for it is through clinical investigation that the findings of science are applied to the advancement of human health.

Physicians (including surgeons and other specialists) are frequently involved in basic research and they are indispensable members of the clinical research team. Research, both basic and clinical, is, in fact, of increasing importance not only in medicine but also in many other major health professions. Dentistry is one notable example and veterinary medicine is another.

Broad-scale cooperation is required in some of the newest and most challenging research efforts. For example, working together in molecular biology and in brain research are the physician and surgeon, the anatomist and physiologist, the biophysicist and biochemist, the biomathematician and the medical engineer.

Drawing upon the knowledge and skill of these and other specialists, research activities already underway may reveal substances in body cells that cause cancer or aging; in blood that cause kidney transplants to fail; in the interaction of complex acids and proteins in cells that may permit control of human heredity. As surgeons and immunologists push forward their studies of how failing human organs can be "traded in" for new ones, others equally dedicated seek to arrest aging, the process that begins at birth.

The Laboratory and Its Twofold Task

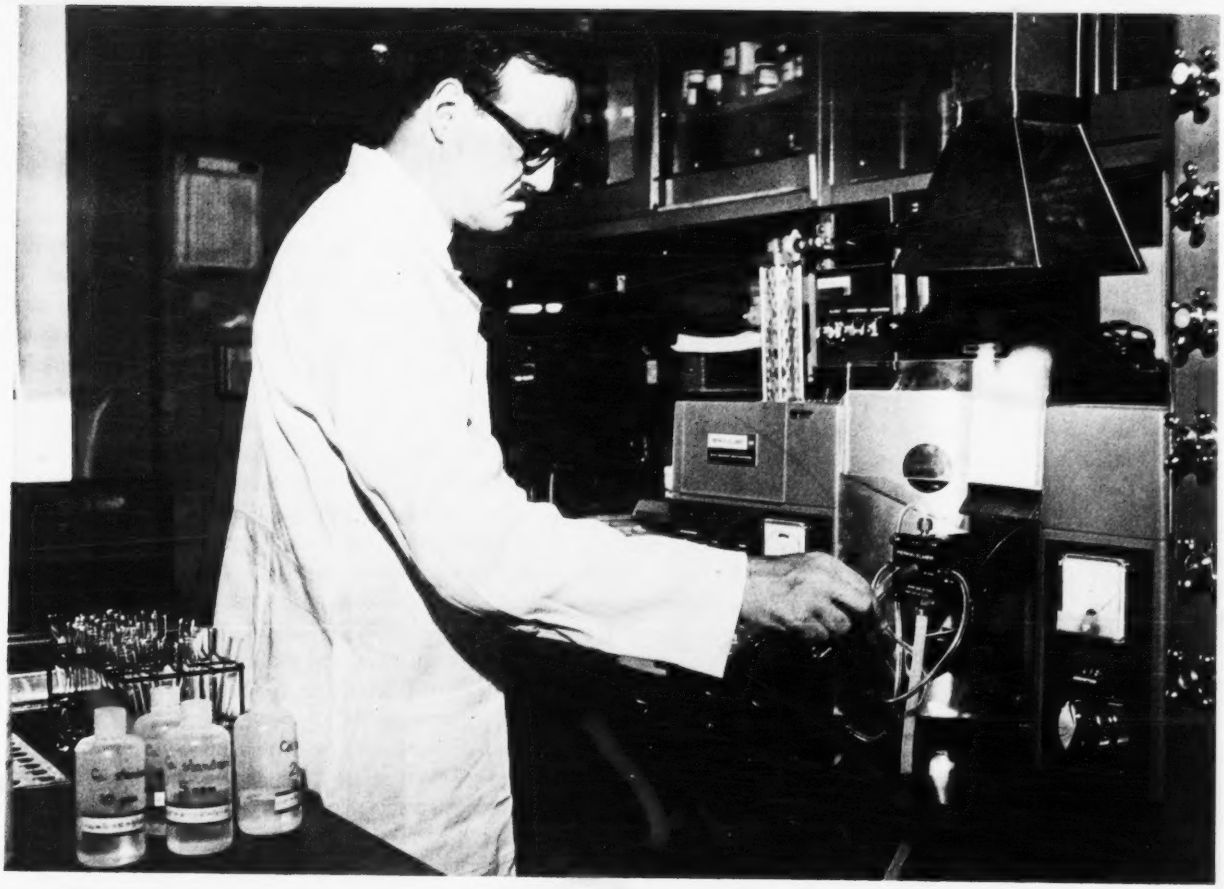
The laboratory is the scientist's workshop—the place where, with his assistants, he carries on his widely assorted activities. These activities fall into two broad areas. One of these is research. The other is the provision of testing services.

Laboratories engaged mainly in research operate in universities, private foundations, some industries, and a number of Federal agencies. National interest in health-related research goes back a good many years and by now many government agencies are involved in it in one way or another—through the work of their own research laboratories, through their grants to universities and similar institutions, and through their fellowships to graduate students.

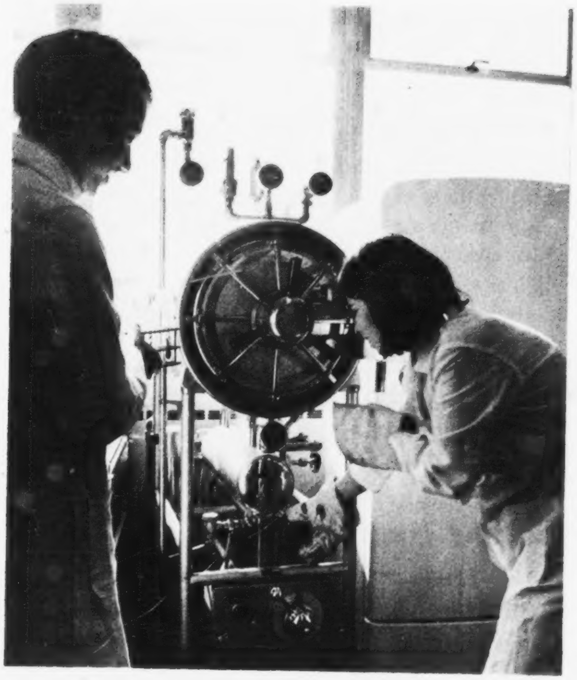
The principal Federal agency supporting health-related research and education of professionals in the health field is the National Institutes of Health of the U.S. Department of Health, Education, and Welfare. Support for special types of research, or of basic science, and for the training of young scientists, is also provided by the National Science Foundation, the Atomic Energy Commission, the National Aeronautics and Space Administration, the Veterans' Administration, the Department of Agriculture, and some other agencies.

Laboratory Testing Services

Laboratory testing services are an integral part of the environmental health programs and other community health protection services administered by health departments. Most local and all State



Medical researchers have at their disposal much sophisticated and complex laboratory equipment and instrumentation in their search for new knowledge in the struggle against disease. Here, an investigator measures saliva abnormalities that may hold clues to cystic fibrosis with an atomic absorption spectrophotometer.



Microbiologists operate an autoclave as part of a research program.

health departments maintain their own laboratories for this purpose. (See the section on Environmental Health Services.)

Such services are essential in medical care, and all hospitals have laboratories for this purpose. This is the province of the pathologist, the toxicologist, and their staff of medical technologists and other skilled laboratory workers. Their testing services produce information which physicians need as a guide for diagnosis and treatment. Having these services immediately at hand is one of the great advantages of modern hospital care.

In their own offices, physicians often have a medical assistant who can take care of relatively simple routine tests. For additional tests, they usually call on one of the independent laboratories which provide such services expressly for the medical profession.

In some cases—perhaps because a particular test is too new, or too costly, or too infrequently required to be widely available, or so important as to make double-checking advisable—an entire community or region may be served by a central laboratory. Such specialized services are likely to be located in the municipal or State health department, a Federal institution, or a large hospital center.

Although health departments and hospitals provide laboratory testing as an essential part of their day-to-day services, this does not exclude them from involvement in research. In large organizations like State or metropolitan health departments or big hospitals, particularly those with extensive teaching responsibilities, the laboratory frequently handles a number of major research projects along with its regular testing services.

Preparing for a Science Career in the Health Sciences

The first and most important task in preparing for a science career is to get sound, broadly based training not only in science but in languages, social science, and the like. This basic training should start in high school, and continue throughout undergraduate college years. Scientists and educators advise science-minded students not to attempt a too-early and too-narrow focus on specialization.

The bachelor's degree will qualify the beginner for an assistant's job. College graduates with experience often begin their careers in a local hospital laboratory, municipal or State public health department, or in the laboratory of a food processor or drug manufacturer. The Federal Government also has openings for recent science graduates in its hospitals and laboratories throughout the country.

Full professional status as a scientist will require additional training, starting with a master's degree and leading eventually to a doctorate in science. This period of graduate training, which usually takes from 3 to 4 years after college, is the time when specialization begins to take shape.

But no other field offers a better chance of financing specialized professional education. Universities, private foundations, industry, and, in particular, the Federal Government are all helping to provide fellowships and other forms of assistance for graduate science students. Most universities also offer part-time jobs as research or teaching assistants. Some employers even pay full or partial salaries to enable their researchers to pursue graduate training.

With the Ph.D., the scientist will be ready to take his place as a full-fledged staff member in an organization where research is a major concern. At the start he will probably work on a team under a senior scientist. With increasing experience and very likely additional post-doctoral study, he will be able to undertake research projects of his own. In the early stages of independent research, each worker carries out his own experiments, but he usually turns to his superior for advice and consultation. Gradually he finds that he is being brought into conferences and given a chance to contribute his own ideas. The time comes when study and experience give him confidence to speak on his own authority in his own field.

Most research scientists, at one time or another or perhaps throughout their careers, do some teaching in graduate or professional schools. Many leading researchers, especially those with medical training (some have both Ph.D.'s and M.D.'s) carry their research through to its practical application in the health services.

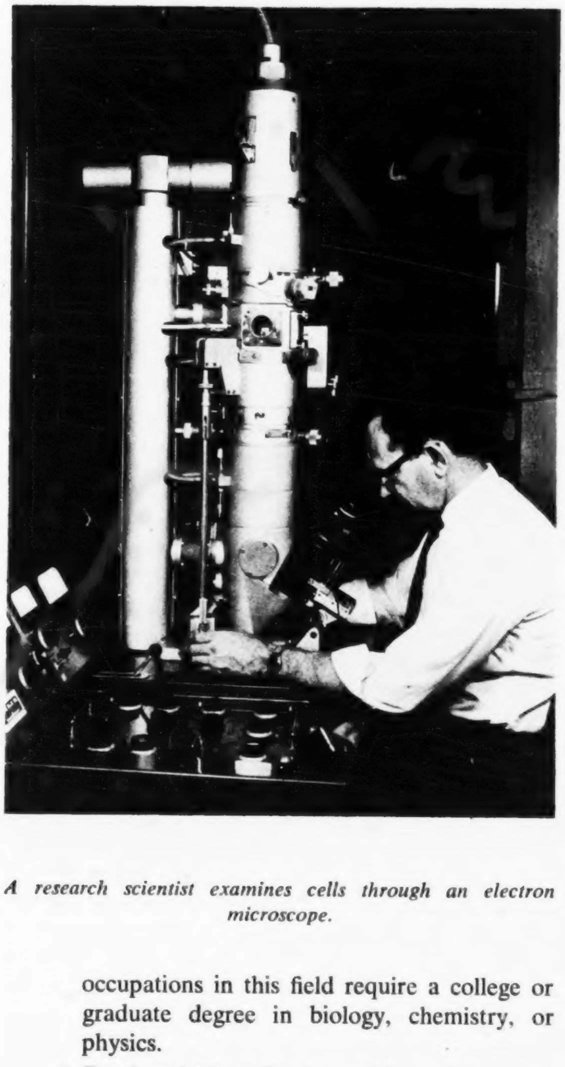
Prospects and Opportunities

The job outlook is promising in health-related professions. Some openings in the health field have almost always remained unfilled in the past, simply because there are not enough workers to go around. No lessening appears likely in the near future in the need for health professionals. This means students sometimes may "pick and choose" the kind of work that seems most appealing, and also indicates that salaries are likely to be as high as many other occupations or higher.

Other Science Careers in the Health Field

Young people planning to study science in college should also take note of these four occupational descriptions.

- Environmental Health Services—Some of the



A research scientist examines cells through an electron microscope.

occupations in this field require a college or graduate degree in biology, chemistry, or physics.

- Food and Drug Services—Most of the people in this field have college or graduate degrees in science, usually biology or chemistry.
- Medical Engineering and Electronics—Mathematicians have an important place in computer technology and computer programming—and therefore in the adaptation of these tools to specialized health purposes. They also cooperate in other aspects of medical engineering and instrumentation.
- Medical Technology Services—This profession represents one of the most familiar science careers in the health field, but it differs from any of the others listed here because it has its own specialized curriculum and training requirements.

Laboratory Occupations

Even if the student doesn't plan on the extensive training required to qualify as a scientist, the idea of working in a scientific laboratory may be appealing.

Laboratory technicians, for example, assist scientists by setting up equipment, performing routine chemical and physical tests, and recording experimental results. In general, such positions call for a good background in high school science and mathematics, preferably with some additional training—a year or so of college or graduation from a technical institute or junior college. Secretaries and other office workers—receptionists, typists, file clerks, and the like—are always needed, and opportunities of this kind are open to high school graduates with clerical training. The laboratory secretary, like the medical secretary, will have even better prospects if she has had additional training looking toward secretarial work in the health field.

Laboratory helpers perform such duties as caring for laboratory plants and animals, servicing laboratory equipment and washing glassware, or handling and storing chemicals, drugs, and other laboratory supplies. Though these workers do not need any special training, their services also represent essential links in the painstaking and scrupulous care required for all scientific operations.

Opportunities for these supporting occupations vary from place to place depending on the number and size of laboratories in the area. Wages are also likely to reflect local pay rates for similar work in other fields of employment. The school counselor or local public employment office can help find out about prospects in your own community.

DOT Code:

Anatomist	041.081–010	Microbiologist	041.081–094
Bacteriologist	041.081–094	Parasitologist	041.081–106
Biochemist	041.081–030	Pharmacologist	041.081–114
Biomathematician	020.088–018	Physiologist	041.081–118
Biophysicist	041.081–038	Serologist	041.081–094
Entomologist	041.081–058	Virologist	041.081–094
Geneticist	041.081–070		

For further information on specific research activities in the basic sciences, write to:

National Institutes of Health
Department of Health, Education, and Welfare
Bethesda, Maryland 20014

Biomedical Engineering

Biomedical Engineer

The biomedical engineer[2] applies theory from the physical sciences (chemistry, physics, geology) and technology from science and industry to the solution of problems in medicine and the life sciences (physiology, biochemistry, biophysics, cytology, neurophysiology).

He has become an important partner, alongside the physician and surgeon, in every aspect of health care and preventive medicine. His contributions have revolutionized scientific and medical research and are responsible for many of the recent dramatic advances in prevention and treatment and in the repair of damage done by accident or disease.

All aspects of engineering are finding application in human biology and medicine. Many of the current efforts fall within the following areas:

- The development of new instruments for use in medical and surgical care or in research.
- The invention and perfecting of devices to repair or compensate for parts of the human body that do not function properly or that have suffered damage as a result of disease or accident.
- The adaptation of computer technology to serve a wide range of specialized requirements in the health services and in health research.
- The application of engineering theory and methods in medical and biological research—in studies, for example, of the structure of the living organism and the mechanisms through which the human body maintains itself in good running order.

Medical engineering draws on many specialties—electronics, fluid dynamics, mechanics, optics, radiation, thermodynamics, and others. Because it draws on so many resources and puts them to use for new and sometimes surprising purposes, biomedical engineers have been described as "creative borrowers." Techniques used in tracking space satellites have been put to work in monitoring systems designed to serve as electronic eyes and ears for the professional nurse in charge of a hospital patient-care unit. Plastics and methods of plastic fabrication, initially developed for the manufacture of ladies' hosiery, are now being used to splice damaged arteries and so to save human lives.

Following is a cross section of each of the major areas in biomedicine with illustrations of what is being done.

Instruments

One of the greatest needs in both medical care and research is to make measurements on organs and systems within the body "noninvasively"—without making any additional holes. X-ray technology has been developed to a high degree for this purpose, but new techniques are now being developed. One such technique uses narrow beams of sound energy in the same way oceanographers use it to locate and plot the position of underwater objects. By this means it is possible, for example, to measure an enlarged liver, to identify the presence and location of a brain tumor, or to find out whether the head of an unborn baby is too large to pass through its mother's pelvic arch. This is accomplished by means of a crystal ultrasound generating transducer connected by a flexible cable with an oscilloscope. The transducer transmits the ultrasound impulses and acts as a microphone to receive their echoes and pass them along to the oscilloscope. The echoes occur when the ultrasound impulses touch solid tissues, and tissues of different density return correspondingly different echoes. Translating the returning signals into visual images, the oscilloscope displays them on the screen where their vertical deflections enable the experienced observer to identify and take the measure of the object or organ with which he is concerned.

Another series of "noninvasive" techniques use radio energy to transmit information from a measuring device that has been swallowed, or is worn. These little transistors have been used as "radio pills" to record the fluctuations in body temperatures, pressures, *p*H and other chemical changes, the presence of internal bleeding, ovulatory activity, and

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[2] Bioengineering, medical electronics, medical engineering, bioinstrumentation, biomedical instrumentation, medical instrumentation. The preferred term is becoming bioengineering.

Physician administers electric shock to cardiac arrest patient with lightweight, battery-operated defibrillator with built-in cardioscope.

digestive activity. They have also been used in research on animals, by surgical implantation to get a "closer look."

Of the many instruments devised by biomedical engineers, here is a small sampling: a tiny microphone that can be introduced via a vein into the heart to diagnose specific heart "murmurs" so that a surgeon can know more precisely what to expect; completely automatic methods for chemical and visual analysis of biological specimens for various abnormalities improving speed and accuracy of diagnosis; use of the laser as a surface and near-surface surgical tool, especially valuable for some sorts of eye surgery.

Replacement and Repair Devices

Some of the most interesting developments in medical engineering have to do with the production of what might perhaps be called "spare parts." Until fairly recently, such devices as did exist were limited to external parts of the body—for example, eyeglasses, dentures, hearing aids, artificial arms and legs. Now biomedical engineering has been put to work to produce new devices such as: an electronic obstacle-detector to help blind people estimate distances, avoid bumping into things, or keep from falling at street curbs or into sidewalk openings; a lifelike artificial forearm and hand powered by an electronic mechanism which is activated in turn by nerves or residual muscle (as it responds to the neural commands, the user can clench or unclench the fist, lift weights, and even write).

Much more revolutionary is the idea of using manmade devices to compensate for the faulty functioning of internal organs, or to repair damaged parts, or even to replace organs damaged beyond repair. Some devices for such purposes have already been developed, and research and experiment give promise of more to come.

Already in use are a number of devices that remain outside the body as they take over the functioning of certain organs at critical periods. One example is the heart-lung machine used to pump and oxygenate the blood during open heart surgery. Another is the electric defibrillator, used to restore the normal beat of a heart stricken by ventricular fibrillation, a potentially fatal quivering of the heart muscles. This device sends an electric current through the heart, thus stopping the quivering and inducing the heart to resume its normal beat.

Still another lifesaving machine is the artificial kidney—a mechanism which takes over the blood-cleaning job ordinarily performed by normal kidneys. One or two treatments a week can maintain people with diseased kidneys who otherwise could

A miniature heart pacemaker, on the right, is undergoing experimental trials at the National Heart Institute. On the left is a normal size pacemaker, similar to the implanted one in the background X-ray.

In an increasingly complex and technical world, computers have become as essential as laboratory equipment in seeking answers to the ills that beset mankind.

not possibly have lived more than a very short time. A new and improved version of the kidney machine can treat as many as 15 patients at the same time; it is simpler to operate than earlier models, and other improvements reduce the possibility of bacterial infection.

Relying on miniaturized electronic mechanisms, medical engineers look toward the continuing development of corrective devices that can be implanted under the skin, leaving the individual free to move about. The heart pacemaker is a pioneer venture in this area. Among projects now underway is the development of an implantable bladder-stimulator to be activated by radio impulses.

Meantime research continues, looking toward the development of more and better materials to patch up or even take the place of organs within the human body. As mentioned earlier, some plastics have already proved useful in some kinds of internal repair; flexible new resins may prove even more helpful as repair materials. Replacement of defective organs is a still more delicate problem, and chemists are continuing their search for materials suitable for engineering fabrication for this purpose.

Such a material needs to be compatible with living tissue and must meet other exacting specifications. An artificial heart valve, for example, has to be made of a material that does not suffer mechanical fatigue under the continuing pressure of blood flow, and its chemical makeup must be such that it does not cause dangerous reactions like blood clotting, chemical poisoning, or corrosion.

Computing Machines and Electronic Data Processing (EDP)

Computers and other electronic "business machines" are helping to streamline and expedite large-scale administrative operations in hospitals, health departments, and throughout the health field. Such equipment is also being adapted for the hospital's medical records and the health department's vital statistics. New tasks, never before feasible, can now be undertaken. In such areas, for example, as epidemiology and the control of widespread diseases as well as in research, automatic data processing is yielding new and significant insights.

Even in medical care, where personal attention is paramount, electronic tools can help the physician and the nurse to make better use of their special skills. Though not in the computer branch of the electronic "family," the monitoring system borrowed from the space program is helping the professional nurse give more intensive care to more patients. Another and very specific data-processing example is the adaptation of computers for use by physicians as diagnostic aids. Though the computer cannot take over the diagnostician's job, experience indicates that it can frequently help the physician to speed up the process and pinpoint his findings.

In one demonstration, several hundred cases were examined in which the problem was to determine the cause of obscure thyroid disorders. In such a diagnosis, the task is to consider many symptoms and to determine the most probable cause in the light of the combined evidence. After the computer's "memory" had been stored with all the possible variables, its answer in nearly every case matched the diagnosis of the highly skilled specialist whose opinions served as a yardstick for measuring the computer's dependability. For the busy general practitioner and his patients, prompt access to such a store of specialized knowledge is of inestimable benefit.

Access to needed information is a critical problem not only in diagnosis (and, for that matter, not only in the health field) but throughout all the sciences. The more knowledge is available, the harder it is for the individual to keep up with what is known or to locate what might be useful in his own work. Here, in helping to capitalize on the "information explosion," automatic data processing systems can perhaps make their greatest contribution to the health field and to science generally. Information retrieval through the use of electronic mechanisms offers the medical and scientific librarian a new tool for dealing with a new and unprecedented task.

Research

In the biophysical sciences, engineering is contributing ideas as well as instruments. Its share in research ranges through almost every aspect of health-related sciences. Medical engineers are involved, for example, in the simulation of complex biological systems leading to increased understanding of living processes; in evaluating the quantitative effects of tranquilizer drugs on muscle fibers; in studying the molecular and crystal structure of the cell and its genetic significance; perhaps most dramatically, in developing new concepts for investigating the communications network of the nervous system and for gaining a new understanding of the human brain—how it learns, how it remembers, how it thinks, how it sleeps.

Career Opportunities

Biomedical engineering is slowly becoming a more and more vital part of all life science activities, from basic research to diagnosis and treatment. Biomedical engineers work in many places—hospitals, research foundations, medical, academic, industrial, and government laboratories, as well as such exotic environments as outer space and under the sea. The challenge to the biomedical engineer will sharpen as he is called upon to control the environmental hazards to life, devise ways to monitor these hazards, and even adapt our very way of life. Wherever he works, routine or repetitive tasks will be few and far between.

Diversification of career opportunities will increase for biomedical engineers, for specialists in allied fields such as electronic data processing, and particularly for various technician specialists.

Educational Background

The medical general practitioner has given way to the medical specialist, but the biomedical engineer must specialize in diversity. He must be able to apply many aspects of engineering to problems in biomedicine. Approaches to problems of this nature require excellence as an engineer—the watchwords are invent and apply—and thorough familiarity with the area of application. Ability to communicate well is vital, and will make all the difference between a mediocre and a good biomedical engineer. An interest in machines, electronic devices, instruments, and the human body is important. Students wishing to prepare for engineering can begin now by getting a good foundation in high school mathematics, biology, chemistry, and physics. After high school, there will be a minimum of 4 years of college leading to a bachelor's degree in engineering.

In the past, biomedical engineers were drawn from among those trained in established engineering disciplines—electrical, mechanical, chemical, civil, and the like. This will no doubt continue for some time. But the engineering student who is looking toward this field will have a headstart if he can include some courses in biology, physiology, biochemistry, or the biophysical sciences generally. Even without this additional background, there are openings for those who are prepared to supplement their college work in engineering through on-the-job training plus some outside reading and study.

Training for biomedical engineering is in process of development at both the undergraduate and graduate level. Some universities have already set up specialized courses, and more are being planned.

Broadly based training is particularly important in a field which is expanding in so many directions. Since no one person can be expected to be equally expert in all aspects of medical engineering, increasing experience necessarily involves some specialization. But flexibility and the capacity to adapt one's skills to a variety of problems are essential. The best preparation for a satisfying combination of specialization and adaptability is sound professional training in basic disciplines.

Biomedical Engineering Technicians

One group of technicians in an area closely associated with biomedical engineering is so well established that it is covered in a separate section—see Orthotics and Prosthetics.

As biomedical engineering expands, there is increasing need for technicians to assemble, adapt, and maintain new kinds of devices and instruments. However, the jobs in which these workers are involved are so diverse that it is impossible to generalize about job duties and requirements.

Technicians from many fields are doing good jobs in biomedical engineering shops and laboratories and are finding new uses for their special skills. Watchmakers, for example, can adapt readily to the making of miniaturized devices. Training in plastics can lead to work on the development of artificial organs. Glassblowers make precision parts for specialized equipment. Electronics technicians are involved in almost every phase of biomedical engineering.

For young people interested in making a start in this field, it is worth noting that special training programs are being developed throughout the country.

DOT Code:	Digital Computer Programmer	020.188–026
	Programmer, Technical	020.188–030
	Electronic Engineer	003.081–034

For further information, write to:
Alliance for Engineering in Medicine
and Biology
3900 Wisconsin Avenue, N.W.
Washington, D.C. 20016

American Institute of Biological Sciences
3900 Wisconsin Avenue, N.W.
Washington, D.C. 20016

Association for the Advancement of Medical
Instrumentation
9650 Rockville Pike
Bethesda, Maryland 20014

Bioinstrumentation Advisory Council of the
American Institute of Biological Sciences
3900 Wisconsin Avenue, N.W.
Washington, D.C. 20016

Dentistry and Allied Services

Dental health is a field of lifetime opportunity for well-qualified professional people.

The dentist's primary concern is to treat peo-

A dentist demonstrates the use of dental forceps.

ple's oral health problems and to help them preserve teeth. He also works in close cooperation with physicians, school health services, and hospital staffs in safeguarding general health and fitness.

The modern dentist emphasizes prevention as well as treatment of oral disorders. He knows better than anyone else that a healthy mouth and teeth are closely related to health in general.

Allied with the modern dentist are the dental hygienist, the dental assistant, and the dental laboratory technician. The number of dentists and trained people who work with them has increased greatly in the last 20 or 30 years; even so, the demand for dental care has increased even faster.

The Council on Dental Education of the American Dental Association accredits the schools for dental hygienists, dental assistants, and dental laboratory technicians, as well as for dentists themselves. Information on all matters relating to educational requirments is available from the council.

Dentist

Basically, the job of the dentist is twofold: To treat ailments or abnormalities of the gums and teeth; and to try to prevent their occurrence or recurrence. He locates and fills cavities, extracts teeth if necessary, straightens crooked teeth, treats gum and mouth diseases, prepares the mouth when artificial teeth become a necessity, and provides dentures to meet the individualized needs of each patient.

The modern dentist is also interested in his patient's general health. He may detect symptoms which call for a physical checkup and work closely with the family physician to correct the trouble. He often works with school nurses and health departments in prevention programs.

Specialization and Prospects

Most dentists are in private practice; they have their own offices and charge fees for their services. Most of them provide a wide range of general care. However, there are a good many dentists who have taken additional professional training in a specialty field and who limit their practice to a specialty area. The eight recognized specialties in dentistry are:

- Endodontics (root treatment).
- Oral pathology (diseases of the mouth).
- Oral surgery (surgery of the mouth).
- Orthodontics (teeth straightening).
- Pedodontics (children's dentistry).
- Periodontics (treatment of the tissues or gums supporting the teeth and the underlying bone).
- Prosthodontics (making of artificial teeth or dentures).
- Public health dentistry (preventing and controlling dental diseases and promoting dental health through community efforts).

A dentist may choose to take a salaried post instead of going into private practice. For those who do, there are opportunities in industry, in hospitals, with one of the branches of the Armed Forces, the Veterans' Administration, public health, or dental research.

One special aspect of dentistry—dental public health—has been gaining wide recognition in recent years. This is concerned mainly with the preventive aspects of dental care and with public education on dental health and dental health services. The health department of most States and many localities, as well as the U.S. Public Health Service, carry on programs of this kind.

There is also growing interest in dental research. Several independent scientific societies, such as the American Association for the Advancement of Science and the International Association for Dental Research, encourage and promote investigations of oral disease. Hospitals, government agencies, and schools now have laboratories concerned with dental research.

Dentists will also find teaching opportunities in dental schools, and those interested in research will also want to become associated with a teaching center. Teaching and research are often combined on a part-time basis with either private or salaried practice.

Personal Qualifications

Good grades, especially in the sciences, and good eyes and skillful hands are prerequisites for dentistry. College students interested in testing their potentialities for dentistry may want to take advantage of the American Dental Association's Admission testing program.

The prospective dentist should also be in good health and have a genuine liking of people; he will be seeing them very frequently in pain and under great strain.

There is no reason why young women should not go into dentistry. Even though they have been in the minority, many more could find a place in the profession. (Currently, about 98 percent of the Nation's dentists are men.)

Education and Licensing

A student interested in dentistry should start early in planning for his career. Applicants for dental school must have a minimum of 2 years at an approved liberal arts college. Three or four years are required by many schools, and at the present, 75 percent of the students enrolled in dental schools have completed 4 years or more of preprofessional education prior to admission.

Both high school and college courses should be selected carefully, with emphasis on scientific subjects. Prospective dental students should seek guidance from faculty members. They are encouraged to write for advice to the admissions officer of the dental school they plan to attend.

Because dentistry takes a special combination of qualifications, dental schools require applicants to take a standard admission test. The details of this examination are explained as soon as an application is received; it is to the student's advantage—as well as the schools'—to learn without delay whether or not he has the necessary aptitudes.

Good grades in high school and college weigh heavily. All dental schools in this country offer a 4-year course leading to a degree of doctor of dental surgery (D.D.S.) or doctor of dental medicine (D.M.D.). The profession and licensing agencies do not make a distinction between these degrees.

Before a dental school graduate can practice, he must pass an examination given by the board of dental examiners in his State. Annual registration is required in some States. A number of States have reciprocal arrangements recognizing licenses issued in other States. Some may require a practical examination.

The American Dental Association conducts the National Board of Dental Examiners. This board gives written examinations accepted in lieu of written State tests in all States except Delaware and Florida. All clinical and practical examinations are administered by State boards.

Dentists who plan to specialize, teach, or do research may continue their education with postgraduate courses, or they may enter a hospital as a dental intern or resident. There is a nationally recognized examining board for each of the dental specialties. To become a diplomate of a specialty board, the candidate must have at least 2 years of advanced educational training (3 years for oral surgery), meet certain other specific requirements, and pass a comprehensive examination.

Those who look forward to a career in the administration of dental public health programs will need to supplement their dental training and basic experience with an additional year's study leading to the degree of master of public health.

The Dentist's Future

Dentists starting out in private practice must face the fact that financial sledding may be difficult the first few years. Office equipment may cost several thousand dollars. Office hours will probably be long and irregular, at least in the beginning. Being one's own employer means shouldering responsibility for office rent, assistants' salaries, and so on. However, private practice offers good income and other long-term satisfactions.

A staff post in a health agency may not offer the potential earnings of private practice, but it does have the advantage of substantial economic security. An added advantage is the opportunity for promoting good health through community service.

Whether the dentist selects private practice, an institutional position in industry or a hospital, or public health service, he will find the investment in dentistry has been well made. He will be working in a highly respected and well-paying profession and have the satisfaction which comes from bringing healing and well-being to people. He can also count on a long period of usefulness.

The demand for dental services is much greater than the supply. Many dentists work more than the customary 40-hour week, and still cannot catch up with their waiting lists. Nearly half of the patients have to wait a week for their first appointment, and in general there is a great backlog.

Dentists in private practice have a wide range of income. Specialists tend to make more money than dentists in general practice, while dentists in middle-sized cities tend to earn more than those in either large metropolitan centers or very small communities. In general, most dentists in private practice have substantially higher earnings than do those in salaried positions.

DOT Code:	Dentist	072.108-010
	Oral Pathologist	072.081-010
	Oral Surgeon	072.101-010
	Orthodontist	072.108-014
	Pedodontist	072.108-018
	Periodontist	072.108-022
	Prosthodontist	072.108-026
	Public Health Dentist	072.108-030

For further information, write to:
American Dental Association
Council on Dental Education
211 East Chicago Avenue
Chicago, Illinois 60611

Dental Hygienist

The dental hygienist provides dental services, dental health education, and nutritional counseling to patients. This is the only dental auxiliary occupation requiring a license.

Primarily, the hygienist provides oral hygiene services: cleaning and polishing teeth, providing diagnostic aids for the dentist, instructing in dental health education, and applying topical agents such as fluorides to the teeth. The hygienist works under the supervision of a licensed dentist.

The majority of dental hygienists are employed in dental office practice; others are employed in public schools, State and local health clinics, hospitals, industry, and voluntary health agencies. The dentist in general practice or specialty practice depends on the hygienist to provide dental services and dental health education.

Personal Qualifications

The dental hygienist must have manual dexterity and coordination and excellent vision. Equally important is a warm personality and a sincere desire to help people.

Getting Started

Graduation from high school is a basic educational requirement for entrance into a dental hygiene program. High school studies should cover the college preparatory course and include biology, chemistry, several years of mathematics, English, and history.

A 2-year dental hygiene program is offered by many community colleges and by other training institutions. Most will accept students for the 2-year program directly after their graduation from high school. On completing the 2-year program, the graduate receives a certificate or associate degree.

Colleges giving the dental hygiene program may require 1 year or 2 years of previous college work. Those requiring 2 years award a bachelor's degree with a major in dental hygiene. Some dental schools also offer a 4-year dental hygiene program leading to a bachelor's degree.

Several schools offer a master's degree in dental hygiene education. This course of study is 1 or 2 academic years beyond the 4-year bachelor's degree.

To practice dental hygiene, the graduate of an accredited program must take a State board dental hygiene licensing examination in the State where he or she wants to practice. Many States recognize the National Board Dental Hygiene Examination sponsored by the American Dental Association. Hygienists who have passed this exam do not have to take the written test in a State board examination, but only the practical test. The initials R.D.H. mean that the hygienist has taken and passed the State board dental hygiene examination and is a registered dental hygienist.

The Hygienist's Future

The dental hygienist who plans to work in dental office practice will receive basic preparation for this position in the program leading to the 2-year certificate or associate-degree program. Positions in public health agencies, public schools, or teaching in a dental hygiene program require a bachelor's degree. If the dental hygienist wishes to secure a position in administration, dental hygiene education, or research, a graduate degree may be required.

DOT Code: Dental Hygienist 078.368–014

For further information, write to:
American Dental Hygienists' Association
211 East Chicago Avenue
Chicago, Illinois 60611

Dental Assistant

Today's busy dentist often needs one or more dental assistants. It is the assistant's job to greet patients, make them comfortable, and prepare them for examination, treatment, or surgery. She also sees to it that instruments are sterilized and ready for use, and assists the dentist while the patient is in the dental chair. In some offices, the assistant prepares solutions, mixes fillings and cement, and assists the dentist in taking and processing X-ray films. She also answers the telephone, makes appointments, orders supplies, handles business transactions, keeps patient records, sends out monthly statements, and maintains tax records.

Because the dental assistant deals with patients during most of her working day, it's important that she like people and that they like her. She needs a pleasant and cheerful disposition. If the dentist specializes in treating children, the assistant should have the gift of getting along with them.

In recent years, many dental schools, colleges, and junior colleges have begun offering special training courses for women who wish to become dental assistants.

Accredited dental assisting courses are offered in dental colleges, community colleges, and technical institutes. Depending on the curriculum, dental assisting programs vary in length from 1 to 2 academic years.

Dental assistants who have graduated from an educational program accredited by the Council on Dental Education of the American Dental Association are eligible for certification by the Certifying Board of the American Dental Assistants' Association. To be certified, the candidate must complete an examination containing written and clinical tests.

Qualified assistants will find employment available in most communities. It is estimated that by 1980, more than 220,000 dental assistants will be needed, more than double the present number.

A properly qualified dental assistant may become a member of the American Dental Assistants' Association.

DOT Code: Dental Assistant 079.378–010

For further information, write to:
American Dental Assistants' Association
211 East Chicago Avenue
Chicago, Illinois 60611

A dental assistant assists the dentist in treating patient.

Dental Laboratory Technician

It is the responsibility of the dental laboratory technician to make and repair such dental restorations as dentures, crowns, bridges, and inlays, under the direction, or according to the prescription, of a licensed dentist. This work requires the most painstaking craftsmanship.

The dental laboratory technician has become a specialist in his own right. His skill in the use of many instruments and techniques, together with his help in designing and developing new equipment and methods, enables him to complement the skills of the dentist in the same manner as the work of the pharmacist complements that of the physician, or the work of the optician that of the eye specialist.

Personal Qualifications

Finger dexterity is essential since the technician must work with a variety of delicate tools and materials. Good vision is also required, as are alertness, artistic aptitudes, and skill in recognizing fine shadings of color. Patience, ability to follow specifications, and an appreciation of the need for absolute accuracy are all essential. This is an occupation in which women recently have shown an increased interest.

The technician's work is not strenuous; consequently, some kinds of handicaps would prove no barrier. Though there may be pressure to meet time schedules, a dental laboratory is usually a fairly calm place to work.

Education and Training

The single educational requirement for most jobs as dental laboratory technician is a high school diploma. Particularly helpful subjects include the sciences, art, mechanical drawing, and shopwork. If possible, the student should acquire basic knowledge of the chemistry of plastics, plus simple metallurgy. Some vocational schools give formal training in dental laboratory technology, and several dental colleges offer approved courses.

Most dental laboratory technicians learn the craft by on-the-job training as an apprentice in a dental laboratory. A more desirable way to prepare for a career as a laboratory technician is to enroll in an approved training program. This consists of a year of formal education and a second year of supervised training in a commercial laboratory.

Although some dental technicians are employed directly by dentists, the great majority work in commercial dental laboratories. Earnings vary according to skills and community salary levels.

Some enterprising and gifted technicians prefer to go into business for themselves. The incomes of these self-employed technicians vary over a wide range. Almost all dental laboratories are owned and operated by former dental technicians.

There are dental laboratories in all parts of the country, but a majority of them are in larger cities. Advancement depends on increased skill. There is no shortage today of technicians who are capable of doing routine work, but there is a shortage of highly skilled craftsmen.

DOT Code: Dental Laboratory Technician 712.381-014

For futher information, write to:
National Association of Certified
Dental Laboratories, Inc.
3801 Mount Vernon Avenue
Alexandria, Virginia 22305

Dietetic and Nutritional Services

Working in this field means dealing with the all-important question of food and what it contributes to health. Modern science has proved that adequate nutrition is one of the basic essentials to good health. It is important in keeping well, and it is a very important part of treatment in many diseases.

Dietitian

The dietitian is educated to provide nutrition care to individuals and groups and to apply the principles of management to planning and directing food service programs. There are four major areas of specialization in dietetics. These are food administration, nutrition care, education, and research.

The director of the department of dietetics in a hospital or related health facility is responsible for all food service for both patients and personnel. Working with the director, the administrative dietitian participates in hiring, training, and supervising food service personnel; writing specifications for purchase of food and food service equipment; planning menus; supervising the quality and quantity of food production. The administrative dietitian may also help the director formulate and execute department policies and develop the department's budget, and the quantity of food production.

A dietitian whose specialty is nutrition care of patients is called a clinical or therapeutic dietitian. She has two basic responsibilities: to see to it that all patients have nutritionally adequate meals and to plan modified menus for patients with special needs. The dietitian confers with physicians about the patients' food and with nurses, medical interns, and other members of the hospital staff on matters relating to patients' eating habits. She also counsels patients on their food needs and on their eating habits when they go home.

A clinical dietitian may also be concerned with clinic patients. Individual or group instructions are given to clinic patients on their nutrition needs and those of their families. Sometimes the dietitian demonstrates the actual preparation of foods.

The clinical dietitian works under the supervision of the director of the department of dietetics.

The teaching dietitian conducts an educational program in hospitals affiliated with medical centers and universities. She plans, organizes, and conducts courses for nursing students, medical and dental students, dietetic interns, patients, and personnel of the department of dietetics.

The research dietitian is a member of the clinical research team. This specialist participates in planning, organizing, and conducting the nutrition components of the research.

Hospitals offer by far the largest number of career opportunities for dietitians, but their services are in demand in many kinds of institutions and programs. These include related health facilities, university and school food service, neighborhood health centers, child care centers, the military services, retirement and children's homes, and industrial and commercial organizations. In general, men working in the field of dietetics are employed in university food service and industrial or commercial fields.

In towns where a single hospital may be too small to make employment of a full-time dietitian practical, two or three hospitals often share the services of one dietitian. The part-time dietitian may spend several days a week in a hospital or related health facility.

Another new development is the self-employed consultant dietitian. These dietitians may be in nutrition practice with physicians whose patients need special nutrition guidance or engaged in services to small hospitals and health-related facilities.

With these numerous and varied calls for dietetic services, job opportunities are no problem for the R.D. (Registered Dietitian). The number of people working in dietetic and nutritional services totaled approximately 30,000 in 1971. There is a serious shortage in this profession today, especially in hospitals. It is expected that the need will continue for a long time to come.

Nutritionist

The nutritionist is an educator concerned with teaching people about normal nutrition and with helping special groups of people develop meal patterns related to their particular needs. Often these are groups with special problems—the aged, families living on a limited income, young mothers with their first babies, or foreign-born groups.

Sometimes the nutritionist works directly with these people, individually or in groups. She may, for example, discuss the nutrition of expectant and nursing mothers with prospective parents enrolled in lessons on baby care. Or she may advise the mother of a child with rheumatic fever on how to carry out the doctor's recommendations about food during the child's convalescence. She often supplies nutrition information for radio and TV programs, or newspaper columns.

The nutritionist shares her special knowledge with her associates on the health team. She consults with physicians, social workers, public health nurses, dental hygienists, and similar professional groups on problems related to food and nutrition. These professionals are then able, in turn, to counsel the large numbers of people they serve, on matters related to nutrition.

Dietitians play important roles in hospitals, medical centers, and other health-related institutions. In medical research, special diets and food preparation, as demonstrated here, are necessary for metabolic balance research patients.

Nutritionists may also take part in community surveys and studies relating to the food customs and needs of groups with special problems. Such problems have many causes—traditional eating habits, low income, limited variety to choose from, to name only a few. A nutritionist is concerned with the communication of scientific knowledge about nutrition in simple, interesting, understandable, and convincing language.

Nutritionists work mainly in government and voluntary health agencies concerned with community health or with the needs of special groups—for example, infants, children, the aged, or people with a health handicap. Today, there is a shortage of nutritionists. They will be in demand for years in agencies concerned with educating the public on the importance of food in physical and emotional well-being. These include public health agencies and international technical assistance programs.

With experience and a master's degree come opportunities for advancement to such positions as nutrition consultant or director of nutrition services in a State or local public health department or voluntary health or welfare organization. Many nutritionists find experience in a related field like hospital dietetics, teaching, or extension work, and then take a year or more of graduate education in public health nutrition.

Conditions of work and opportunities for advancement are as diversified as the agencies with which the nutritionist may work.

Schooling and Standards for Both Dietitian and Nutritionist

Though the dietitian and the nutritionist work in quite different settings, the required preparation for both professions are quite similar.

Students looking forward to becoming dietitians or nutritionists should have an interest in good food and an appreciation of cookery; an interest in teaching and sharing knowledge with others; and a special aptitude for the sciences (such as chemistry) related to food. They should also have the capacity to work hard and present a healthy appearance.

A college education is required. The college major is generally in home economics, with special emphasis on foods and nutrition, related sciences, and institution management. Courses in the behavioral sciences, such as psychology, sociology, and teaching are also desirable. In fact, it is wise to begin preparing, even before college, with courses in chemistry and other sciences.

Several universities offer programs in dietetics which prepare graduates for beginning positions. However, most graduates in dietetics with a bachelor's degree enroll in a dietetic internship approved by the American Dietetic Association.

Several universities offer a 18-month program which combines the dietetic internship and graduate study leading to a master's degree.

Advancement to the more important positions depends on experience, capability, and to some extent, on additional study. Many dietitians and nutritionists go on to complete education for a master's or a doctor's degree. For those who wish to specialize in teaching or to go into nutrition research, a Ph.D. is essential.

Dietitians and nutritionists who have met certain academic and experience requirements are eligible to join the American Dietetic Association. Their membership is considered important because it serves in lieu of a certification or licensure and provides evidence that the individual has met high stan-

A dietitian selects components as part of a nutrition research program.

dard qualifications. The designation R.D. (Registered Dietitian) may be used by members who pass an examination and take a given number of hours in continuing education every 5 years. The association's pin and sleeve emblem worn on the uniform are also a mark of professional status.

Dietetic Technician

The dietetic technician is involved directly in food administration and nutrition care services.

The duties in food administration may include quality food production, developing standard recipes, managing a cafeteria, and training of personnel. The duties in nutrition care may include taking diet histories of patients, calculating modified diets, teaching patients normal nutrition, and visiting patients to evaluate the food.

Duties vary with the size and organization of the department of dietetics. In a large hospital, the dietetic technician works under the supervision of a dietitian. In a small hospital or related health facility, the dietetic technician is responsible for total food service to patients and works under the direction of a consulting dietitian or an administrator.

Dietetic technicians are in demand by hospitals and related health facilities. More recently, they have become engaged in teaching low-income families about food purchasing, preparation, and nutrition; directing food service in day care centers; and assisting nationals of other countries in adapting their menu patterns and in purchasing and preparing. These duties are performed under the direction of a nutritionist.

Preparation for the career of dietetic technician includes an associate degree program for dietetic technicians in an accredited junior college and successful experience under an R.D. Opportunities for advancement and for mobility in dietetics are unlimited. An appreciation of quality food, interest in people, and skill in management are desirable qualifications for dietetic technician.

Dietetic Assistant

The dietetic assistant, or food service supervisor, works under a dietitian or a dietetic technician. The duties depend on the size and organization of the department of dietetics. In a large hospital, the responsibilities are usually concerned with day-to-day food service operation or nutrition care services. Duties may include ordering food and supplies, supervising employees, training new workers, participating in nutrition care services to patients, or assisting in the food service to patients or personnel. In a small hospital or nursing home, the dietetic assistant may be responsible for the daily food service operation under the supervision of an administrator and a consulting dietitian.

Dietetic assistants are in demand in hospitals, nursing homes, and related health facilities. A career as a dietetic assistant requires leadership ability, basic knowledge about food and nutrition, an interest in working with food, and ability to work well with people.

Preparation for the career of dietetic assistant includes a high school education or equivalent and completion of a course in food service management with supervised experience meeting the standards of the American Dietetic Association.

Dietetic Clerical Worker

In general, the clerical worker assists the dietitian with paper work—and there is a great deal of it in a dietetics department. In addition to general secretarial and clerical duties, this includes typing menus, purchase orders, and recipes; tallying the food supplies issued to the cooks; preparing worksheets; calculating recipe and menu costs; and the many similar office tasks involved in large-scale food service. No special training is required beyond basic stenographic and clerical skills of the kind taught in a high school business course. Salaries are approximately the same as those paid clerical workers in other fields.

Dietetic Worker

It takes a good-sized staff to run any large-scale food service. The number of people required and the extent to which each one specializes in just one part of the operation depend on the size of the hospital and on the patients' needs.

But, whether the institution is large or small, the jobs that need doing cover the whole range of food preparation—storing, preparing, cooking, and serving, as well as dishwashing and kitchen cleaning. Every one of these jobs is an important link in maintaining high standards.

Training is usually given on the job. However, new courses are currently being introduced in vocational high schools to prepare students and adults for food service employment. For employees who show interest and aptitude, classes under a dietitian may be offered in such subjects as nutrition, food preparation, storage, and sanitation. With experience, it is possible to qualify for positions of greater responsibility.

The food service staff works under good conditions. Good lighting, good ventilation, and good sanitation are "musts." Rates of pay vary with experience and skill and with wage levels in the community. Hours, vacations, and other conditions of employment are determined by the personnel practices for all hospital staff.

Related Occupations

For description of a group of occupations concerned with the provision of wholesome foods, see the section on Environmental Health Services.

DOT Code:	Dietitian	077.168–014
	Dietitian, Administrative	077.168–018
	Dietitian, Chief	077.118–010
	Dietitian, Teaching	077.128–014
	Dietitian, Therapeutic	077.128–018
	Nutritionist	077.128–022
	Research Nutritionist	077.081–010
	Food Service Supervisor	319.138–010
	Dietary Consultant	077.128–010
	Dietetic Intern	077.168–010
	Diet Clerk	079.588–010

For further information, write to:
American Dietetic Association
620 North Michigan Avenue
Chicago, Illinois 60611

Economic Research in the Health Field

Economics is the study of the production, distribution, and use of wealth—the goods and services that satisfy human wants. One of these is health services. Economists have been drawn into the study of the health service system to improve its efficiency so that it will benefit the greatest number of people with the highest quality of medical care, at the lowest cost.

Medical care today is a gigantic enterprise. Hospitals, clinics, private medical practice, rehabilitation services, and diagnostic services together take care of tens of millions of individuals each year. If the number of people seen is multiplied by the number of medical visits or treatments for each, then health "contacts" run into the hundreds of millions a year. Measured by the number of people employed in it, the health services constitute one of the largest industries in the country. The costs go into the billions, annually.

As health services expand and as the ability to purchase medical services is extended, the role of the economist becomes increasingly important.

The primary tool of the economist in the health field is research. It is his responsibility to set up research projects which will answer questions such as these: Is individual doctor-patient practice more economical or less economical than group practice? How much purchasing power for medical services does the average American need to take care of ordinary illnesses? Of emergency illnesses? Of chronic illnesses? What kind of fringe medical benefits would be appropriate in a particular labor-management contract? What proportion of a hospital budget should go to salaries, to equipment, to supplies, to overhead, to research, or to expansion of services? Is one type of health insurance better than another?

Education and Training

Formal training for economics in the health field starts with a college education and a major in economics. Courses will include such subjects as economic theory and history, public and international finance, money and banking, labor, consumer economics, statistics, and accounting. Since few colleges have undergraduate or graduate courses specifically geared to economics in the health field, specialized education will come in graduate work.

Though many positions are open to college graduates, those looking toward advancement as economists will want to go on to a master's degree. Advancement to major posts generally requires a doctor's degree.

As in graduate training generally, the M.A. takes a year's additional training after college; the Ph.D. takes 2 or 3 years beyond that. For those looking toward specialization in the health field, graduate training may include not only advanced courses in economics but also in such health-oriented subjects as public (or public health) administration, medical care administration, hospital administration, health statistics, epidemiology, and the sociological aspects of health.

Economists in the health field will find career opportunities mainly in the universities, government (Federal, State, and large city health departments), large trade unions, and industrial and business management. Large medical complexes, as well as some of the national voluntary health agencies, will employ economists. New positions are opening up in community health demonstration projects.

As faculty members of university graduate schools, economists usually combine some teaching with their research activities. They may also take on occasional outside jobs as consultants. In other organizations, health economists usually have a place on the overall administrative staff. In addition to conducting research studies, they often serve as advisers and consultants, taking an active part in program analysis and development.

Related Occupations

For descriptions of related careers, see the sections on Health Statistics, and on Sociology in the Health Field.

DOT Code: Economist 050.088-014

For further information, write to:
National Center for Health Services
Research and Development
5600 Fishers Lane
Parklawn Building
Rockville, Maryland 20852

Environmental Health Services

There was a time when the only environmental health hazards we had to be concerned about were the communicable diseases transmitted through contaminated water supply, food, and air—diseases such as typhoid fever, diphtheria, cholera, botulism, and hepatitis.

But industrial developments of the past 50 years have introduced an entirely new class of environmental health hazards. Among these are exhaust fumes from automobiles, industrial and chemical plants, incinerators, and furnaces; chemical waste, human waste, garbage, refuse, and detergent chemicals in rivers, lakes, and seas; herbicides and insecticides in food; injurious chemicals, fumes, and dusts to which workers in certain industries are exposed; and radioactivity from X-ray, radioactive isotopes, fissionable material, and atomic and nuclear fallout.

Control of these many different types of environmental health hazards are the concern of a number of different professions. The specialists from these different environmental health services often work as a team in tackling a particular problem.

Industrial Hygienist

Many years ago, little could be done about industrial hazards and toxicants, except to rotate workers or otherwise limit their exposure. The day-to-day exposure to harmful chemicals, dust, noise, heat, and similar conditions was simply accepted as the price one had to pay for a job in a particular plant or industry.

Nowadays, industrial hygienists, safety engineers, physicians, and other members of the industrial health team have eliminated many unhealthful conditions in industry. The industrial hygienist's task involves three interrelated functions: to recognize hazards and detect their development promptly; to evaluate their seriousness; and to prescribe methods of eliminating or controlling them.

Industrial hygienists may urge drastic changes in a process or even in an entire plant where unsafe conditions are found to exist. Where necessary, they may recommend costly modification or replacement of equipment. Frequently they order substitution of less toxic materials, even at the expense of greatly increased production costs. During emergencies they may even have authority to order a shutdown of operations when there is no time to confer with management.

Today the industrial hygienist battles conditions that were unknown or considered of little importance just a few years ago. Radiation, fungi, air pollution, noise, vibration, poor lighting—all are considered conditions to be overcome. The industrial hygienist is also concerned with protection of the worker against discomfort, fatigue, and other influences that may contribute to low morale and inefficiency.

In large organizations with full-scale occupational health programs, the overall staff is usually headed by a physician, and may consist of a dozen or more persons, including industrial hygienists, chemists, physicists, bacteriologists, laboratory testers, and industrial engineers. In smaller companies, on the other hand, the hygienist may not only assume responsibility for the industrial hygiene program but may also perform other functions, such as that of safety engineer or personnel officer.

Although most industrial hygienists work in an industrial setting, many are also employed by transportation companies and public utilities, suppliers of industrial safety equipment, State and local health departments, the Federal Government, mining companies, large agricultural operations, insurance businesses, and commercial businesses. A few are self-employed as consultants.

Personal Qualifications

Anyone planning a career as an industrial hygienist should be interested in science or engineering and have a strong desire to apply technical knowledge in a practical fashion.

A keen sense of responsibility is essential. Health and comfort, and even life, may depend on his experience and knowledge. On occasion, the industrial hygienist may find himself on precarious middle ground between management and workers—as, for example, when an unpopular or costly change in equipment or work patterns may be the only solution to a serious health problem. In such circumstances, tact and patience are essential if he is to get the cooperation needed for a successful environmental health program.

Education and Training

The basic educational requirement for industrial hygiene is a college degree with a major in engineering or one of the physical sciences. The trend is toward a requirement of a master's degree in one of the basic disciplines or in an area of categorical program specialization. The prospective industrial hygienist should have a strong high school background in math and science, preferably covering chemistry, biology, and physics. In college, a number of majors are open to him, including biology and physics. Courses in biology and biochemistry are highly desirable, as are courses in psychology, personnel management, and business administration.

Because of increased public interest in ecology, all levels of government are now allocating more funds for new and expanded specialized educational programs that should increase the future supply of qualified environmental health service personnel.

Prospects

Industrial hygiene is still a fairly small field. The latest estimate available indicates that nearly 1,700 industrial hygiene personnel are employed in private and public sectors, but opportunities are increasing throughout the country. Openings may be concentrated in industrialized areas and large cities.

DOT Code: Industrial Hygienist 079.188-010

For further information, write to:
American Industrial Hygiene Association
25711 Southfield Road
Southfield, Michigan 48075

Radiological Health Specialist

The use of artificial sources of radiation has increased greatly in the last few decades. Medical, dental, and industrial X-ray are used widely. Radioactive materials are employed in medicine, industry, and research. These, as well as nuclear energy production and the fallout from nuclear weapons testing, are examples of applications of manmade sources of radiation which add to the exposure of the general population.

The benefits that man may derive from the controlled use of radiation are numerous. Radioactive materials, obtained chiefly as byproducts of nuclear power production, and radiation-producing machines are used in medicine to diagnose diseases and injury of the human body, to treat cancer, and to study such conditions as heart disease, multiple sclerosis, and arthritis.

Industry, too, has found many uses for radioactive substances—for example, measuring the laundering efficiency of detergents and washing machines; determining friction wear tests on tires, piston rings, and carbon brushes; and using a "radio eye" to record the weight of coal in moving freight cars.

In agriculture, radioactive substances help research scientists to identify patterns of plant and animal growth and to develop better yielding plant varieties.

Power produced by nuclear reactors is used to heat and light cities and to propel submarines and surface ships.

Along with these benefits of radiation, man incurs risks. Careful control of radiation can, however, limit exposure to people and minimize risks. This is the major responsibility of radiological health programs. Exposure hazards must be balanced against the benefits of radiation uses, and unnecessary exposure eliminated. The radiological health specialist and other radiological health personnel, together with the users of radiation-producing devices and materials, seek to maintain this balance and to assure that adequate protective measures are used.

Personnel Needs

One of the distinguishing and most interesting aspects of the profession of radiological health is that its practice requires the application of many scientific and professional disciplines—biology, chemistry, physics, engineering, and medicine—and, of course, combinations of these disciplines:

- Biology: Radiobiologists are concerned with and study the effects of radiation on living systems, especially man.
- Chemistry: Radiochemists analyze air, water, and food for radioactivity in order to assess the hazard to people.
- Physics: Physicists are concerned with what happens when radiation penetrates matter and with measuring radioactivity and radiation; their work provides a basis for determining the extent of health hazards.
- Engineering: Control of most radiation hazards involves design and construction of specialized equipment or facilities, and this is an engineering task. The nuclear reactor is an example. Engineers with special training in radiation shielding and containment are required for design and construction, and sanitary engineering skills are needed for the treatment and disposal of the radioactive wastes produced by operation of the reactor.
- Medicine: Physicians trained in nuclear medicine, radiology, and public health make important contributions to radiological health. These include assessing radiation exposure, developing safe practices in the clinical use of radiation, and treating radiation injury.

A radiologic health specialist and an environmental technician measure the velocity of a stream containing radioactive materials.

In a large program, specialists in several of these fields may work together on radiological health problems. In smaller programs, a radiological health specialist may have to use information and skills from all of these fields to solve problems which face him.

In addition to the scientists, engineers, and physicians who become radiological health specialists, this program draws upon the cooperation of many other health professions.

Nurses contribute greatly because of their role in the safe handling and use of radioactive materials.

Pharmacists dispense radioactive drugs for diagnostic and therapeutic uses in medicine and must be aware of radiological health problems.

Veterinarians contribute to radiological health by conducting studies of radiation effects on animals which, in turn, yield significant information applicable to man.

Radiologic and nuclear medical technologists play a vital role in radiological health through the care that they exercise to minimize unnecessary radiation exposure.

Education and Qualifications

For radiological health specialists, educational requirements are generally similar to those for comparable jobs in other research or public health occupations. A bachelor's degree in one of the sciences or in engineering is usually the minimum requirement for anyone who expects to work at levels beyond that of the technician. Graduate training leading to an advanced degree is generally required for higher level positions. Physicians, of course, must go through medical school and internship followed usually by a period of specialist training.

In addition to a trend toward higher educational requirements for personnel in the radiological health field, there is, as previously mentioned, an increasing need for individuals with training in two or more related areas, such as biochemistry, biophysics, and engineering-physics. A strong background in mathematics and the ability to communicate effectively, orally and in writing, are essential.

Both men and women may seek radiological health careers. General traits that are necessary for a successful career are the same as those required in all scientific fields and include good mental and physical health, above-average intelligence, curiosity, caution, thoroughness, patience, perseverance, and logical reasoning power.

Prospects

People with adequate training in the various disciplines comprising radiological health are in short supply. Opportunities are surprisingly varied. The qualified professional worker interested in a challenging career will find many positions waiting and will be able to choose, to a great extent, the type of work he wishes to do and where he wishes to do it. The types of organizations open to individuals interested in radiological health occupations are numerous—government, hospitals, and private industry, to name a few.

With the growing demand for radiological health personnel comes an increasing need for teachers and researchers, especially at the university graduate-school level. A teaching career offers certain advantages. Frequently an instructor can combine research with teaching or he may augment his salary by service as a part-time consultant to industry or government.

Many fellowships and scholarship awards are available to assist the qualified radiological health student in his education. These economic aids are offered by Federal, State, and local government agencies; industry and research foundations; and colleges and schools of public health.

DOT Code:	Radiation Monitor	199.187-010
	Radiographer	199.381-010

For further information, write to:
American Registry of Radiologic
Technologists
2600 Wayzata Boulevard
Minneapolis, Minnesota 55405
or
Radiological Society of North America
713 East Genesee Street
Syracuse, New York 13210

Safety Engineer

The safety engineer serves employer and employee by minimizing accident hazards and promoting safe work habits in plants, mines, or wherever else industrial accidents are likely to occur.

His primary job is to prevent the human suffering brought about by unsafe conditions and by careless and improper use of equipment. His secondary goal is to prevent damage to equipment or materials, to minimize interruptions in plant operations, and to reduce the heavy personnel and insurance costs associated with accidents. His responsibility may extend in some cases to fire protection and all on-the-job safety activities.

Before he can prevent accidents, the safety engineer must know what causes them. He investigates every mishap to learn whether the cause is in human failure, failure of the worker to use necessary safety precautions, mechanical error, structural defect, and so forth. He does this by inspecting working conditions, materials, and equipment; by watching workers going about their jobs; by analyzing accident statistics; and by consulting with the industrial physician, the industrial hygienist, the personnel director, the union representative, and with the workers themselves.

With the facts in hand, he can then recommend equipment changes, new safety rules, or perhaps an expanded safety-education program. He is expected not only to keep management informed of safety problems and requirements, but to carry out an effective program of accident prevention, training, and compliance with changing industrial safety laws and standards.

Education and Training

A bachelor's degree in engineering, the physical sciences, or business administration offers the basic initial preparation for this profession. Additional specialized training, in the form of special courses or a full year's graduate study, is necessary for a thorough grounding in all facets of this work.

Basic Skills

The safety engineer must be good at gathering facts—and at organizing them to throw light on a given situation. A knowledge of mechanics is also important since he will be dealing very frequently with tools and machinery.

Satisfactory implementation of the safety engineer's recommendations depends on his ability to persuade and convince employees and employers to participate and cooperate.

Prospects

Most safety engineers are employed by private industry. Some are in government service, while others work for casualty insurance companies. Some have become consultants, serving on a fee basis to industries which need specialized or short-term assistance.

Although relatively few people are employed as safety engineers, the growth in occupational health services and increasing mechanization in industry are expected to produce many new opportunities.

DOT Code:	Safety Engineer	012.081-010
	Air Analyst	012.281-010
	Industrial-Health Engineer	012.188-034

For additional information, write to:
American Society of Safety Engineers
850 Busse Highway
Park Ridge, Illinois 60068

Sanitarian

The sanitarian's basic duty is interpretation and enforcement of city, State, Federal, or other laws regarding sanitary standards, in food, water supply, garbage disposal, sewage disposal, housing maintenance, and so on.

The sanitarian plays an important role in obtaining community action for better health through environmental health control. He is in a position, for example, to promote and help to secure such improvements as water supply extension, improved sewage disposal, safer recreational areas, and more hygienic conditions in nursing and convalescent homes. In addition, he must be alert to the host of new sanitary problems created as the population increases and as more and more people move into the cities and suburbs of expanding metropolitan areas. With his technical training and experience, the sanitarian is equipped to recognize and anticipate sanitation hazards. It is part of his responsibility to call these problems, and his recommendations, to the attention of the government bodies concerned, the community leaders, civic groups, and general public.

Sanitarians having supervisory duties analyze reports of inspections and investigations made by other environmental health specialists and advise on difficult or unusual sanitation problems. They conduct investigations and give evidence in court cases involving public health regulations. In addition, they promote health laws and engage in health education activities. Those in top management positions are involved with planning and administering environmental health programs and coordinating them with programs of other agencies. Other duties may include advising government officials on environmental health matters and drafting health laws and regulations.

Public health sanitarians work closely with other health specialists in the community (such as the health officer, sanitary engineer, and public health nurse) to investigate and prevent outbreaks of disease, to plan for civil defense and emergency disaster aid, to make public health surveys, and to conduct health education programs.

In large local and State health or agriculture departments, and in the Federal Government, sanitarians may specialize in a particular area of work, such as milk and other dairy products, food sanitation, refuse and other waste control, air pollution, occupation health, housing, institutional sanitation, and insect and rodent control. In rural areas and small cities, they may be responsible for a wide range of environmental health activities.

Where Employed

An estimated 8,000 of the approximately 10,000 professional sanitarians employed in 1968 worked for Federal, State, and local governments. Most of the remainder worked for manufacturers and processors of food products. A small number were teachers in colleges and universities, a few were consultants, and others worked for trade associations, in hospitals, or for other organizations. Probably less than 1 percent of all sanitarians were women.

Sanitarians are employed by public health departments in every State and by private industry in most States. About half of them work in 10 States: California, Florida, Illinois, Indiana, New York, Ohio, Pennsylvania, Texas, Virginia, and Wisconsin.

In addition to professional sanitarians, about 5,000 sanitarian technicians and aides were employed in 1968.

Training, Other Qualifications, and Advancements

A bachelor's degree in environmental health is the preferred preparation for a beginning job as a professional sanitarian, although a bachelor's degree in a basic science generally is acceptable. High level positions usually require a graduate degree in some aspect of public health. In some cases, sanitarian technicians having 2 years of college and work experience can advance to professional sanitarian positions. However, rising hiring standards are restricting entrance to professional positions to those with a bachelor's degree.

Science courses recommended by the American Public Health Association for the first 2 years of college are mathematics, biology, chemistry, physics, and elementary bacteriology. In the second 2 years, the recommended program includes advanced general bacteriology, medical entomology, and a series of public health courses. Liberal arts courses also are considered useful.

Thirty-one colleges and universities offered undergraduate programs in environmental health in 1968; graduate training in environmental health was available in about 100 universities. Some stipends are available under Federal programs for graduate study in this field.

Beginning sanitarians usually start at the trainee level, where they remain up to a year, working under the supervision of experienced sanitarians. They receive on-the-job training in environmental health practice and learn to evaluate conditions and recommend corrective action. After a few years of experience, they may be promoted to minor supervisory positions with greater responsibility. Further advancement is possible to top supervisory and administrative positions.

To keep abreast of new developments and to supplement their academic training, many sanitarians take specialized short-term training courses in such subjects as occupational health, water supply and pollution control, air pollution, radiological health, milk and food protection, metropolitan planning, and hospital sanitation.

In 1968, 31 States had laws providing for registration of sanitarians. Although requirements for registration vary considerably among the States, the minimum educational requirement for registration usually is a bachelor's degree, with emphasis on the biological, physical, and sanitary sciences.

Opportunities and Prospects

Employment opportunities for educationally qualified sanitarians are expected to be very favorable through the 1970's, as State and local health agencies expand their activities in the field of environmental health. Radiological health, occupational health, food protection, water pollution, and air pollution are expected to require the services of more trained personnel.

Air pollution has attracted attention throughout the United States, especially in large cities where smog has become a problem. The discomfort and danger of air pollution from the exhausts of automobiles and from the fumes of industrial plants and other sources have been recognized in legislation at levels of government. The possible relation of respiratory ailments to air pollution also has served to focus attention on this problem.

The expanding population is yet another factor that will intensify the demand for more trained sanitarians. The migration of people from rural to urban areas, along with the growth of industries, will place a greater strain on the food service, housing, water, recreational, and waste disposal facilities of urban communities. Some increase in demand for sanitarians is expected in private industry, primarily in the food industry.

Working Conditions

Sanitarians spend considerable time away from their desks. Some come in contact with unpleasant physical surroundings, such as sewage disposal facilities.

Sanitary Engineer

Sanitary engineering safeguards man's environment—air, water, food, and shelter—by uprooting removable hazards and controlling those that cannot be completely eliminated. Beyond this, it attempts to get the benefit out of all environmental influences in the interests of public health. In short, the purpose of sanitary engineering is to maintain surroundings that are clean and safe, so that people can enjoy all the conveniences which modern technological achievements have made possible.

The sanitary engineer is responsible for design and operation of water supply systems and water purification processes, waste disposal systems, milk pasteurization plants, the control of insects and rodents, and standards for safe and healthful public housing.

Communities call upon the sanitary engineer to deal with other public health problems that range from protecting oyster beds to reducing a city's nerve-racking noise.

Protection of the water supply is one of the most important concerns of the sanitary engineer. His work in this area has made it possible for us to drink a glass of water in any city in the Nation without qualm about disease.

Because detergents and garbage grinders are altering the composition of sewage, plants may have to undergo significant changes in engineering design to cope with these new additions. This is another responsibility of the sanitary engineer. Air pollution has become a serious economic problem in many areas of the Nation. It costs the American people an estimated $11 billion each year in wasted fuel and damage to property, while it contributes to the ill health of the people exposed to it.

Nuclear power plants are supplanting fossil-fuel plants and in time will eliminate much of the air pollution from the emission of sulfur compounds. But here, once again, new environmental health problems in the form of radioactive contamination of the air and water resources have arisen to challenge the skill and ingenuity of the sanitary engineer.

This profession is advancing rapidly to keep abreast of technological progress which creates many new health hazards. Consider, for example, the possible effects of today's increased use of chemicals in food production; of the enormous increase in the use and diversity of insecticides, pesticides, and herbicides; of the increased use of synthetic materials in clothing, in buildings, and in countless household items. Consider, also, the need for better city planning and the part that the sanitary engineer can play in it.

Qualifications and Training

The sanitary engineer holds an engineering degree and practices one of the professional engineering specialties. The distinctive mark of this specialty is that it combines engineering training and ability with a broad knowledge of the health sciences, including biology, bacteriology, chemistry, and physics. Although sanitary engineering is a recognized specialty, it is also an interdisciplinary profession and its practitioners are often required to seek syntheses of knowledge and techniques from all fields of engineering and the physical biological sciences, as well as from the social sciences.

A 4-year course in electrical, chemical, civil, public health, mechanical, or sanitary engineering, or in a similar major field of study is one of two educational qualifications the sanitary engineer must possess; he must also have had specialized training in the sanitary sciences, including a knowledge of chemistry, physics, and the biological sciences. Specialization at the undergraduate level is for the most part limited to the civil engineering program. Since further specialized training is generally required for professional advancement, graduate study is becoming increasingly important. Scholarship and fellowship assistance for graduate training of sanitary engineers is available from Federal agencies and other sources.

But since the profession is itself changing and growing, educational standards are not uniform for all colleges and universities, and the prospective student will want to keep his ultimate objective in mind when planning his professional education.

Sanitary engineers should be registered or licensed under the registration laws of their States. The American Academy of Sanitary Engineers is a national organization that provides for specialty certification of sanitary engineers.

Opportunities and Prospects

The present supply of qualified sanitary engineers is extremely limited, and the young college graduate who enters the profession will have an unusual range of opportunities. Sanitary engineers are needed at every level of professional training.

A substantial group of sanitary engineers is employed by governmental agencies—Federal, State, and local. Of these, the largest number work either in public health agencies or in public works agencies. A number of others work in industry, and still others are private consulting engineers.

Sanitary engineering is represented by a number of professional organizations; they have joined to form the American Sanitary Engineering Intersociety Board and the American Academy of Sanitary Engineers, which are concerned with specialty certification in general and improving the practice, elevating the standards, and advancing the cause of sanitary engineering.

DOT Code:	Sanitarian	079.118–014
	Sanitary Engineer	005.081–046
	Purification—Plant Operator	005.081–038
	Sewage—Disposal Engineer	005.281–050
	Public Health Service Officer	187.118–042

For further information, write to:

American Public Health Association
1790 Broadway
New York, New York 10019

Environmental Technician

Environmental technicians assist the environmental health specialists in the technical aspects of their work. They engage in a wide range of activities which may include obtaining samples of air, water, and food, and assisting in performing tests to determine quality; operating or assisting in the operation of water and waste water treatment plants and solid waste disposal facilities; and inspecting and evaluating to determine compliance with laws and regulations.

Environmental technicians are employed by State and local health departments, air pollution control organizations, water purification plants, waste water treatment plants, solid waste collection and disposal units, radiation protection units, consulting firms, and a variety of business and industrial firms concerned with environmental control.

Need for Trained Workers

Since this is, in large part, a new field, job specifications and training programs for many of the different types of environmental technicians have not been worked out. As a result, people with various combinations of academic and practical training have moved into the field, taking over some of the technical work that was formerly performed by the professionals, but that did not require full professional training.

The majority of people working as environmental technicians today have had as their preparation and background at least 2 years in a junior college or community college or technical school, with concentration of the technical aspects of the particular field they planned to enter.

Various community and junior colleges have already implemented vocationally oriented curriculums for specialists in one or more of the environmental technical areas.

The exact number of environmental technicians is difficult to estimate. The number employed as technicians in environmental protection was 69,500 in 1970 and the estimated deficit was 16,500. By 1980, at the present rate of population growth and pace of environmental problems created by that growth, about 214,000 trained technicians will be needed. Today's rate of training at the technician level is less than 1,000 new graduates per year; at that rate, there will not be enough trained people in 1980 to meet the demand.

Educational Requirements

Liberal arts courses are necessary to prepare technical personnel, who must have a knowledge of and skill in effective communication, understanding of people and their interactions, the comprehension of the levels of government and the part that each plays in the political process.

In communications, recommended topics may include English composition, grammar, report writing, and speech. Social sciences may include such courses as sociology, political science, psychology, and economics.

Sciences such as physics, chemistry, mathematics, and biology may be classified as the foundation upon which further technical courses are built. Most of these courses may be the same as those provided to students who plan to transfer to a baccalaureate program. Basic sciences may include one or two courses in the areas of mathematics (algebra, trigonometry, geometry), physics, chemistry, biology, microbiology, and/or ecology.

During the first school term, potential technical students should be offered a survey course covering the broad scope of environmental protection. This kind of course will provide students with sufficient background upon which to base a decision for further work in the environment.

Areas of further study that may be included in the technical areas are: water quality, air quality, food protection, vector control, solid waste management, shelter evaluation, industrial hygiene, noise control, radiological health, environmental planning, and accident prevention.

Since all of the desired skills cannot be given in the academic program, field training in a local environment control program is necessary.

Environmental Aide

The environmental aide assists professional personnel and technicians in carrying out prevention, control, and service programs. He performs routine tasks under supervision. The aide is usually a high school graduate and receives on-the-job training in various environmental protection activities. An estimated 101,000 aides were employed in 1970 in public water supply and waste water collection and treatment, industrial waste disposal, solid waste collection and disposal, community sanitation and rodent control activities, industrial safety, air pollution control, and recreational management.

Environmental aides have varying amounts of on-the-job training, vocational education, and/or appropriate short-course training in specialized subjects.

There are a wide variety of short technical courses in environmental subjects offered by the Environmental Protection Agency and the Public Health Service. In addition to the short courses conducted in the States in response to requests, short technical courses for continuing education are also offered by several other Federal agencies and non-Federal institutions.

For additional information, contact:

Office of Manpower Development and
Training
Environmental Health Service, PHS
Department of Health, Education, and
Welfare
Room 18-81, Parklawn Building
5600 Fishers Lane
Rockville, Maryland 20852

Food Technologist

Food technology—one of the newest and most rapidly growing fields open to young men and women—has been created by the recent revolution within our huge food industry. Until about 30 years ago, there had been little change in the canning techniques developed by Nicholas Appert to preserve food for Napoleon's armies. Nowadays, however, science and technology are showing us many more ways of safeguarding fresh food and of preserving food—for example, by refrigerating, freezing, dehydrating, concentrating, and more recently by freeze drying.

The food technologist defines the basis of his profession as the application of science and engineering to the production, processing, packaging, distribution, preparation, evaluation, and utilization of foods. He employs his scientific knowledge and special skills to solve the technological problems which come up in connection with the development of products, processes, or equipment; the selection of raw materials; fundamental changes in the physical condition of any food where industrial processing is involved; or the nutritional value of such foods and their suitability for human consumption.

This pioneer field offers exceptional opportunities in the food industry. Depending on where he works and the size of the organization, the food technologist is variously concerned with improving the nutritive value of food, producing more acceptable food, preventing food spoilage, and improving the processing and preserving of foods. He is interested in the containers that protect food and in the effects of warehousing and distribution. One of his interests is quality control—testing raw materials and finished products to be sure they are pure, safe, and accurately labeled. Whatever his particular job, the health forces of the Nation look to him to safeguard our food and to help develop more healthful, varied, and abundant foods for more and more people. The U.S. Department of Agriculture reports that for every four Americans who sat down to a meal in 1950, another person will be at the table in 1975. It is up to the food technologist to help fill the fifth plate, and he is working on this through the development of new sources of both natural and synthetic foods.

Opportunities

Because it is relatively new, there are many routes that you could follow in reaching a professional position in this field. You might begin, for example, as a chemist or bacteriologist, or even as a process engineer in a canning factory. From some such post, you might go to the research department, where new products and processes are developed. In fact, so intense is the interest today in scientific food research that opportunities are plentiful.

Training

You should get the best possible advice on the colleges offering degrees in food technology, for good training is essential and the kinds of training available in this field vary widely. Some colleges do not have a separate department of food technology. Some offer a program leading to a bachelor's degree, but no further. Others have graduate programs leading to a master's or a doctor's degree. The Institute of Food Technologists can send you information that will help you choose your college and advise you of scholarships that may be available.

Whatever college you select, your first 2 years should include courses in such basic science subjects as chemistry, bacteriology, physics, nutrition, biology, and mathematics. In fact, your whole program should give you a thorough understanding of the fundamentals of science, engineering, and agriculture, together with their application to the manufacture and processing of foods. A master's or doctor's degree is highly desirable if you plan a career in research, and it is a necessity if you plan to teach.

Prospects

Though we all benefit from it, the new profession of food technology isn't yet very well known. But, in time, when public acquaintance with the profession catches up with its achievements, it should gain wider recognition. In a field so young, possibilities have only begun to shape up, the challenges are many, and, to a considerable extent, professional standards and traditions are still in the making. For those who are intrigued by the practical application of science and don't mind pioneering—who would like the feeling of growing up with their profession, and, indeed, perhaps even of contributing to its growth—food technology may well offer many stimulating openings.

Related Occupations

For other occupations offering opportunities for chemists and biologists, see the section on Basic Sciences in the Health Field.

For other occupations dealing with food and nutrition, see the section on Dietetic and Nutritional Services.

For further information, write to:
Career Guidance Committee
Institute of Food Technologists
221 North LaSalle Street
Chicago, Illinois 60601

Government Food and Drug Inspector and Analyst

Imagine how difficult the work of the family doctor and neighborhood druggist would be if they could not be sure the medicines they prescribed and dispensed were safe and effective. And suppose the hospital or school dietitian, the public health nutritionist, and the housewife could not be sure that the foods they buy are safe, pure and wholesome, and made under sanitary conditions.

Protecting health and lives through safeguarding such products is a vital part of the teamwork effort to build a healthy, vigorous Nation. Both government and industry share in this effort. Legal requirements are enforced by the U.S. Food and Drug Administration and by State and local health agencies.

These protective services extend in many directions and call upon the services of many different kinds of specialists. In addition to the services described here, there are, for example, important protective services within the drug industry—the counterpart of those in the food industry. (See the section on Pharmacy.)

If food technologists are the "improvers" of food products, government experts are their legal protectors—and, in the same way, the legal protectors of drugs. Both the Federal Government and the States have food and drug laws. Milk and food sanitarians, for example, have an important place in these protective services in most States. (See the section on Sanitarians.) But the inspection of foods and drugs is handled in different ways in different States, and the Food and Drug Administration (FDA) has still broader responsibilities. Because of these differences, a generalized picture of food and drug protection services would not be entirely realistic. Federal careers in this field, as described here, are not only important in themselves but also show the scope and opportunities of the field as a whole.

FDA enforces the laws Congress has passed to ensure the safety of foods, drugs, household products, toys, and cosmetics, and the safe use of hazardous household substances marketed in interstate commerce. Federal law requires that these products be safe, honestly packaged, and informatively labeled.

To enforce food and drug laws, the Federal Government employs inspectors and laboratory analysts who are concerned with the purity and safety of both groups of products and with the effectiveness of drugs. With most foods packaged these days, the consumer must depend upon their labels as his guide in buying. Consequently, the government expert not only checks the food itself and the conditions under which it is manufactured, but also examines the package labels. Labels must be accurate and tell the whole story. Drugs need—and get—the same kind of security and legal protection to make sure their safety is established before they are distributed to the public. For example, FDA tests thermometers to determine whether they give correct readings, tests and certifies insulin and antibiotic drugs to assure purity and potency, guards against the illegal distribution of drugs that should be sold only on physicians' prescriptions, and enforces the law against bogus "health devices" of various kinds—such as $750 silver lockets that are supposed to generate cosmic rays.

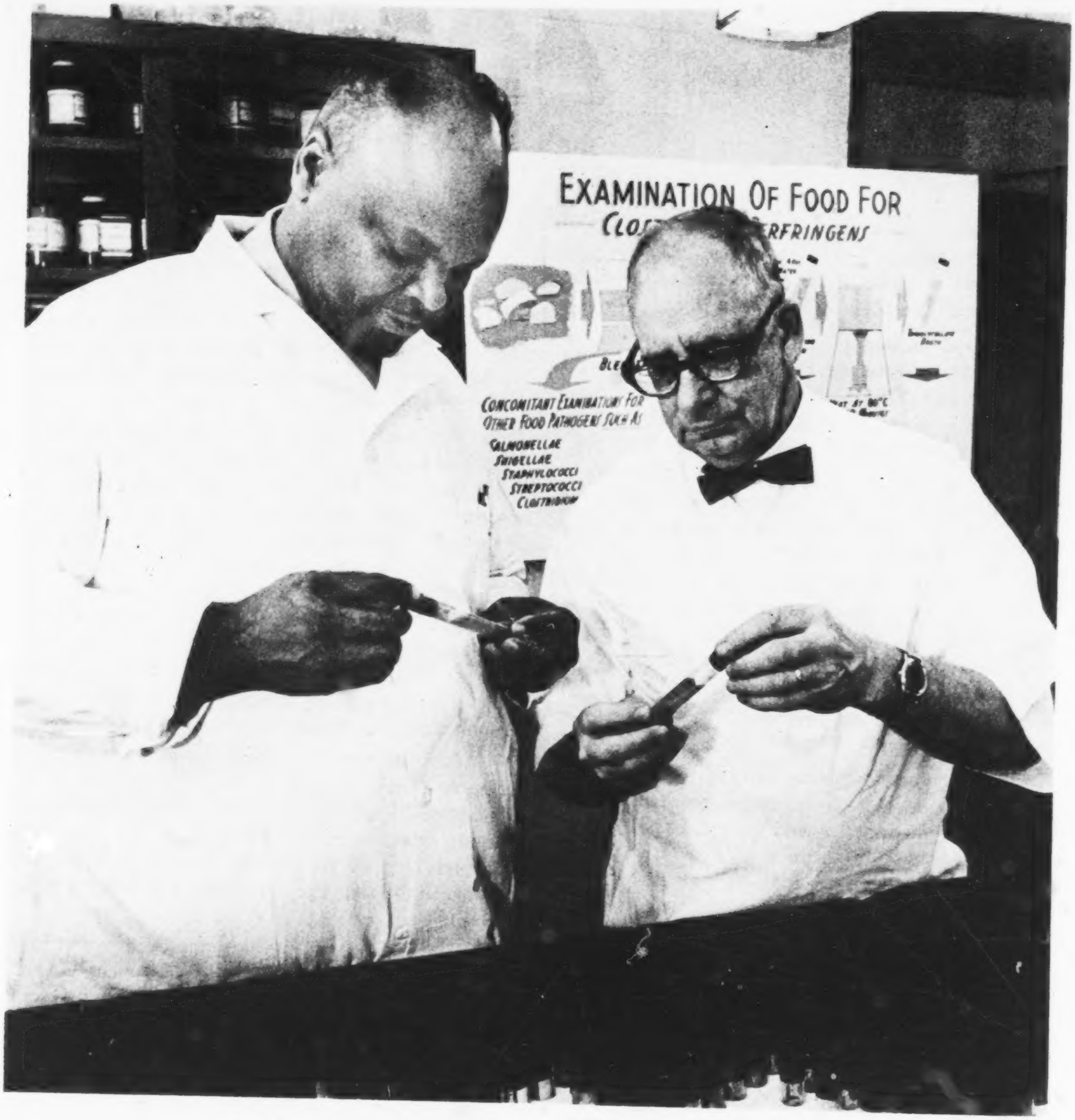
When drugs or foods that violate the law are found, they are seized in Federal court actions. For example, seizures have included drugs that did not measure up to standards of strength, foods containing poisonous insecticide residues, foods processed under unsanitary conditions, and toys that were unsafe and dangerous.

The inspector aims to provide protection before foods and drugs reach the consumer, and except in rare instances, he succeeds. His work takes him wherever foods and drugs travel on their way to the consumer—into the mill, the factory, the processing plant, the shipyard, the transportation industry, the storage warehouse, the restaurant, the drug store. He examines the sanitary conditions in factories and the techniques and controls used in the processing, packaging, and labeling of products. He collects samples of suspect shipments, investigates complaints, and reports evidence of law violations.

Inspection protects the American food and drug manufacturers as well as the public. One of the inspector's important duties is to watch out for the accidental spoilage or contamination that may occur in foods and drugs—from the time they are raw materials to the time they are ready for delivery to the consumer.

Food inspectors are also employed by the Meat Inspection Branch of the U.S. Department of Agriculture. Most of these are veterinarians, though some chemists and bacteriologists are also engaged in this kind of inspection. This agency administers the Meat Inspection Act, which protects the consumer by regulating all meat food products shipped from one State to another in interstate commerce. (See the section on Veterinary Medicine.)

Standing behind the inspector who makes the on-the-spot check are laboratory analysts—both men and women—who test the inspector's samples more intensively than he is equipped to do himself. They check the purity of the samples submitted, and also whether these comply with what their labels claim. They also do intensive research work on the safety and effectiveness of products and on the development of methods for analyzing them. Through this second kind of research, they improve ways and means of determining the composition of foods,


EXAMINATION OF FOOD FOR
CLOS ERFRINGENS
CONCOMITANT EXAMINATIONS FOR
OTHER FOOD PATHOGENS SUCH AS
SALMONELLAE
SHIGELLAE
STAPHYLOCOCCI
STREPTOCOCCI
CLOSTRIDIUM

Scientists examine test samples of contaminated food substances.

drugs, and cosmetics, and of detecting and measuring spoilage and contamination. This combination of analysis and research takes specialists in many sciences—chemists, biochemists, microbiologists, pharmacologists, food technologists, physiologists, laboratory technicians, and a host of others.

Training and Qualifications

The inspector should have at least a bachelor's degree with a science major. He must be able to use scientific instruments and methods for on-the-spot testing during his inspections. He needs good judgment, an inquiring and accurate mind, a sense of public service, and the ability to meet and get along with many different kinds of people. His contacts may include anyone connected with any phase of the giant food and drug industries—from manufacturer, research chemist, assembly-line foreman, warehouseman, to retailer—not to mention court officers and consumers.

The laboratory analyst should have 4 years of college, with a sound base of science courses, and a major in chemistry, bacteriology, zoology, physiology, medical technology, or some allied field. A master's or doctor's degree in the field of specialization is often necessary for the top research jobs.

Prospects

The research specialists in FDA laboratories put science to work through their efforts to devise new and better methods of analyzing products. Inspectors and field analysts must keep abreast of current production, packaging and distribution techniques, and study new developments in food and drug chemistry.

This kind of specialization offers opportunities to the outstanding college graduate. Though inspector positions are limited to the two Federal agencies concerned and the corresponding units in the State agencies, there are many openings for beginners who have the advantage of receiving on-the-job training and other formal training to aid their advancement.

DOT Code:	Drug Analyst	029.281-016
	Food and Drug Inspector	168.287-042

For further information, write to:
Division of Personnel Management
Food and Drug Administration
U.S. Department of Health, Education,
and Welfare
Rockville, Maryland 20852

Health Department Administration

Health departments are government agencies. A local health department serves an entire community, generally a city or county. As an arm of government, it is supported by tax funds and has a very special kind of responsibility; as an organization with communitywide obligations, it has a very complex job.

The health department operates within legal framework defining the geographical area under its jurisdiction and the services which it is required or authorized to provide. Stated simply, the department carries out its duties through programs of service, law enforcement, and health education and information. These programs are directed toward such broad objectives as promotion of health protection for all the people in the community; development and maintenance of a healthy environment; and an aggressive attack on major causes of disease and disability.

All government public health agencies—Federal and State, as well as local—have similar characteristics. But there are differences, too.

In the State health department, for example, basic functions include enforcement of State health laws and providing guidance and financial assistance to community health departments. So also the U.S. Public Health Service has similar relationship with State health departments; in addition, it represents the Nation as a whole in interstate and international matters relating to health. Federal and State public health are both deeply involved in initiating and supporting training and research.

State health departments and the U.S. Public Health Service offer many career opportunities in all kinds of service and at all levels of responsibility. But though the range of assignments is broader than in most local health departments, the essential skills required do not differ substantially from those needed in the administration of community health departments.

Local Health Officer

Whether the community health department is large or small, its administrative head is almost always a physician, and in most cases one who has had specialized professional training and experience in public health. There are a few departments with nonmedical administrators.

Regardless of the size of his department and the community it serves, every chief health officer has certain basic responsibilities.

One of these is to develop what might be called a balance sheet on the health situation in his community. This requires compiling health statistics and keeping them up to date. It also involves periodic appraisals of the community's health needs and their social and economic causes. With this kind of information at hand, the health officer is prepared to call attention to gaps in community health services and to initiate planning to plug the gaps.

Though the health department has responsibility for fact gathering and analysis, interpretation and promotion, and planning, the actual provision of comprehensive health services is a task not for the health department alone but for the entire community. The health officer contributes to this task in two ways: He administers the direct services for which responsibility is assigned to his department by law; and he takes leadership in stimulating community-wide cooperation and action. He seeks to bring together partners in this overall task—the organizations and individuals in the community concerned with health, including his own department, members of the health professions, the hospitals, the voluntary health agencies, the public schools and universities or professional schools, labor and industry, and the individual citizens.

The health officer is responsible for overall administration. His staff, in most health departments, includes a number of other public health physicians, many of whom head separate health-department programs. Other specialists may also serve on the health officer's immediate staff or as division heads. They might include the specialists responsible for department programs on environmental health, health statistics, public health nursing, or public information.

Together, these top professional people make up the health officer's "cabinet."

Management Specialist

The average State or local health agency once was considered the province only of the physician, the nurse, and the sanitary inspector. With the expansion and growing complexity of modern health agencies, there developed a whole group of people whose specialty is in the management field. These people have responsibility for planning, coordination, direction, and evaluation of health programs.

Some of the work roles of a "management specialist" are: program analyst, program representative, or "administrative assistant." In some larger agencies these may be separate jobs. In most agencies they are combined.

As a program analyst, the management specialist would be involved in planning the department's program.

As a program representative, he would go out into the community to interpret, implement, and expedite. He might be engaged in fact-gathering, or in the interpretation of complex economic or social research data, or in promoting public participation in new health services.

He may also work as a "contact man" either with community agencies or with individual members of the health professions and other civic leaders. He may also represent the department in dealings outside the community, that is, with the State health department, local health agencies in other communities, or committees of the State legislature.

The management specialist would also function as administrative assistant on departmental administrative matters. Good management in a health department involves certain basic duties, including preparing the budget, keeping budget records, and accounting; personnel administration, secretarial typing, filing, and related clerical services; purchasing, property inventory, and supply room services; other supporting services.

In a small health department, the health officer usually takes direct responsibility for administration and for the supervision of administrative personnel.

In a somewhat larger department, the separate functions, such as budget and finance, personnel, office management, and purchasing and supplies, are supervised by administrative assistants. These assistants, in turn, report to the health officer.

In a still larger health department, administrative services are usually brought together in their own division, under a divisional director. In such cases, the budget officer, personnel officer, and so on, each has his own staff, and each reports to the division head rather than to the health officer. The director of administrative services has an important place in the department's top staff. In addition to his many specific responsibilities, he serves as adviser to the health officer and the professional staff.

Young people interested in management positions in a health department should plan to get a bachelor's degree.

If the college major bears some relationship to the job duties to be undertaken, so much the better. Program representatives, for example, would benefit from psychology, statistics, public administration, or the social sciences. Administrative assistants would find business administration or accounting to be helpful.

This would only qualify the management specialist for a beginning job in a health department. To advance to executive levels would require a year of study beyond the bachelor's degree, in health, public, or hospital administration, together with several years of management experience in a health department.

DOT Code:	Public Health Service Officer	187.118–042
	Medical Officer	070.108–038
	Administrative Assistant	169.168–014

For further information, write to:
American Public Health Association
1015 18th Street N.W.
Washington, D.C. 20036

Health Education

Health Educator

It is the function of the health educator to give people the facts about health and disease so they will act for their own well-being and that of their families.

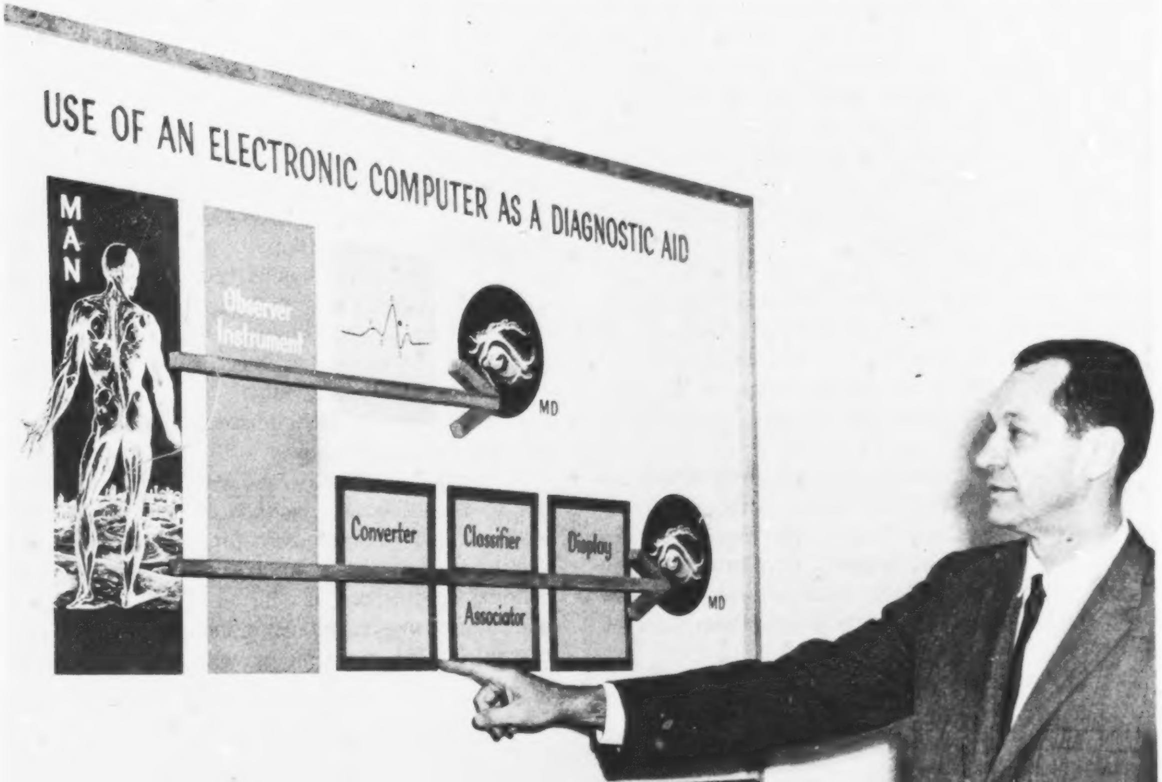
The health educator tells people about the dangers of smoking so they will be persuaded to quit, the importance of regular health checkups so they will get them, the hazards of overweight so they will eat sensibly, and the importance of polio "shots" so they will get them.

This states the function of the health educator in simple terms but the process is much more complicated.

The health educator seldom talks directly to the people he hopes to influence. He works, instead, through a wide variety of intermediaries in the community—teachers, club leaders, health officers, public health nurses, trade-union program directors, Scout leaders, community group leaders, and others. Through these intermediaries he reaches a much larger audience than he would by himself. There is, however, another reason for working through them. These are "opinion molders"; they have a personal relationship with those being educated and are therefore likely to have a greater influence with them.

The health educator will meet with groups of these intermediaries and work out health education

A health educator explains the development and use of computers in medicine.



programs with them to be incorporated in their regular daily activities. He also prepares or directs the preparation of guides for conducting these educational activities and the materials (leaflets, films, exhibits, slides, posters, etc.) that are going to be used.

The health educator also works with another type of intermediary—the mass media (newspapers, magazines, radio and television, trade newspapers, organizational newsletters, etc.). He either prepares or directs the preparation of the appropriate articles, features, photographs, which can be used by the media, or he works with the writers, editors, or program directors so they can prepare it. As a result, the influence of the health educator is extended to vast audiences who could not otherwise be reached.

Admittedly, contact with the public through the media is less desirable than personal contact. Nevertheless, it is the maxim of health education, as of other educational efforts, that many methods are used to complement and reinforce each other and to have a cumulative effect.

The ultimate goal of health education is action—getting the person being educated to take the necessary steps for preservation of health or safety. But this goal is not always achieved. Most smokers, for example, keep on smoking no matter how many times they have had the danger pointed out to them. Few people use their auto safety belts, despite the repeated messages on television on the importance of using them. The dangers of alcohol and drug abuse are being repeatedly dinned into the minds of young and old, yet alcoholism and drug addiction continue to increase. Considerable health education goes on with the populations of "inner cities" and "ghettos." Yet, much of it is ignored.

The educator has recognized that it is not enough just to point out the hazards of a particular practice or the advantages of another. There are all sorts of obstacles to perception and appropriate action. These might be emotional resistances, language barriers, social and economic barriers, psychological blocks, and so on.

Whatever they are, it is the job of the health educator to identify and then devise methods to overcome them or sidestep them. Otherwise, education will have no effect, or, to put it more properly, education will not take place, since education is more than information—it is successful motivation for effective action.

To get at the bottom of these resistances, the health educator may use various techniques of investigation: interviews, surveys, community studies, together with the insights gained from psychology and sociology.

A basic tenet of the health educator is that final decisions about health practices should be made by the individuals involved. Nevertheless, he accepts a responsibility to provide access to all sources of information and experiences needed by the individual so he can relate desirable health practices to his personal goals, aspirations, and values—the things he cares about.

The health educator thus serves as a psychological stage-setter—stimulating people in the community to recognize health problems of which they may be unaware and to work for their solution. Such problems might have to do with pollution of the environment, chronic disease, overpopulation, drug abuse, or any of hundreds of ills which plague our society today. The health educator knows that constructive group action can often accomplish wonders in behalf of health. Even more important, when people themselves work together to solve a problem of common concern, they will arrive at the solution which will work for them.

Moving along with an interested group when it is ready to act, the health educator will help its members set up effective working relationships with other interested groups in the community—schools, churches, health agencies, welfare organizations, labor unions, and the like. Perhaps the health educator will assist them in organizing a conference, planning a neighborhood cleanup campaign, or developing a television series dramatizing poor health conditions in farm labor camps. He may contact resources, coordinate interagency efforts, or administer other aspects of the program. Whatever his duties may be in any particular case, his aim is to encourage more effective individual and group action designed to maintain and improve the health of people throughout the community.

The health educator is prepared to use any number of very different methods of communication—whatever the situation calls for. He is expert in a variety of individual, group, and community educational approaches, as well as in how a wealth of educational media and materials can be used most effectively. He experiments with new educational techniques, such as closed circuit television and teaching machines, to find how they can be utilized optimally in the health field. Sometimes he helps a group create its own educational materials—an experience which often leads to greater learning than could ever result from exposure to the most polished professional teaching aids.

Sometimes the problems in taking health action lie not with the community, however, but with the people providing health services. Clinic hours may be arranged more for the convenience of the professionals than of the public. Clinic workers may be curt and impersonal in their treatment of the people they serve. Advice may be given in technical terms rather than in language that people can easily understand. In those cases, the health educator can play an important role by helping other health personnel plan and deliver health care in ways which the community can and will use. Similarly, the health educator often has a job to do in educating legislators and other policymakers that consumer interests must be considered in planning and funding health programs.

With major changes taking place in the delivery of health care at local, regional, and national levels, participation of health educators in planning groups is increasingly in demand. By seeking the involvement of all persons who have an interest in the problem, the health educator helps assure that it is understood from each of the many dimensions which bear on its solution. He utilizes group skills and understandings to aid each member of the planning team express his own ideas and listen to other points of view. He helps define common goals and stimulates and guides discussion as necessary to help the group reach its own decisions and determine how they will be carried out. Thus, whether helping a ghetto neighborhood to plan its own health center or helping representatives from State agencies to agree on needed

Health educators, working at the community level, watch a demonstration of how a water system chlorinator operates.

regional medical facilities, the health educator helps people to help themselves by bringing needs and resources together to create new partnerships for health.

Frequently, improving health care involves training—for health workers who need to keep abreast of new knowledge in their own professional disciplines through continuing education; for young people entering new health careers; for neighborhood health aides who will help to improve health communications among the poor; for citizen volunteers who are ready to assume new community leadership. Here again, the health educator can contribute to better health by consulting on the development of training programs, by suggesting creative methods, and even by training the trainers themselves to be better teachers.

Health educators, then, are modern pioneers—seeking new understanding into human behavior, new ways to apply this knowledge in health education, and new approaches to building stronger and healthier communities.

Training and Qualifications

Health education is a relatively new profession; consequently, individuals with many kinds of backgrounds have been and are now working as health educators. Some have strengths in administration or social welfare, or public information, or community organization. Some were at one time in nursing, teaching, environmental health, and similar occupations. Many of these people, who saw this new field of education developing and liked its looks, reinforced their college background where necessary, especially in the physical and social sciences and education. Some went on to professional study in the field of health education.

Today the requirements for becoming a qualified health educator are more exacting, and all the signs point in the direction of strengthened professional standards. Leadership position in the field require a master's degree. This includes training in fundamental public health areas, such as disease control and environmental health. It also includes in-depth preparation in educational program planning and theory and methods analysis of health education problems. Most master's degrees in health education are offered by schools of public health, although a few universities without such schools have recently been accredited to provide such training. Many of these institutions have available financial assistance of one sort or another to enable deserving applicants to complete their professional training.

An increasing number of colleges and universities are now offering a bachelor's degree in community health education. These programs (with instruction in the biological and social sciences and basic health education skills) prepare the student for many community jobs as well as for graduate study if he so desires. A bachelor's degree with a blend of broad, solid courses in physiology, bacteriology, chemistry, biology, educational and social psychology, sociology, and cultural anthropology also provides the basic underpinnings needed for admittance to master's degree programs.

More and more openings also are becoming available for health education aides and assistants. Background requirements for such positions vary, and training usually takes place on the job. Nevertheless there is a considerable interest in developing a 2-year college program for health education assistants, leading to an associates of arts degree. As with the bachelor's degree program, the A.A. degree which is contemplated would prepare the student for a job immediately upon completion of training, as well as provide him with the basic schooling necessary for admittance to the next step of the career ladder.

Doctoral degrees—traditionally the highest academic degree available—are also offered in public health education. Many doctors in this specialty are needed now, and more are expected to be needed in the future, to meet rapidly growing demand for research and evaluation skills in health education and for teaching in institutions of higher learning around the world.

Students planning a career in this field should obtain information about the educational requirements of the schools in which they are interested. Some schools offering the master's degree also require a certain amount of practical work experience prior to professional education. Some agencies have special paid positions for career development in health education, and others offer exciting jobs for volunteers. Getting involved in a community health project, a neighborhood health center, or a hospital clinic is also good experience for the would-be health educator. Opportunities to develop skills in communication and public speaking, leadership techniques and group work, community organization, and educational methods should all be welcomed.

Like workers in many other health occupations, the health educator needs to enjoy people and work well with them. But something more is needed in terms of personal relationships. He must be able to play a variety of roles successfully according to the demands of the situation. At times he will work in a behind-the-scenes capacity, helping others start and carry out projects for which they properly get the credit. At times he must be able to help people caught in conflict understand each other's point of view while he maintains the trust and good-will of all parties concerned. And at times he must be the people's advocate until they come forward to speak for themselves.

Since the health educator works with people, his greatest satisfactions come from people—from seeing them take action which will lead to better individual and community health, from watching them develop their ability to solve their own problems, from sharing their sense of achievement in doing something they didn't know they could do.

Opportunities and Prospects

Because this is a small but rapidly expanding profession, it has grown from 600 in 1950 to nearly 2,000 professionally trained health educators today. Rapidly increasing scientific developments and knowledge, the initiation of new health and social programs, and the expansion of existing ones—in all of which education is a critical component—have created tremendous needs for health educators. Thus the demand exceeds the supply.

New positions are constantly opening up for men and women in local, State, and Federal agencies, voluntary health agencies, international health programs, community and regional planning councils, poverty projects, the Peace Corps, hospitals and clinics, industry, agricultural extension services, colleges and universities, and professional societies. There is a special need for members of various ethnic minorities to work with their own population groups, since common interests and understanding are invaluable assets in communication and education.

Related Occupations

Health educators have similarities of educational background or on-the-job activities with a number of other health careers—for example:

- Social Psychologists—see description on Psychology.
- Sociologists and Anthropologists—see description on Sociology in the Health Field.
- Information Specialists—see description on Health Information and Communications.
- Public Health Nutritionist—see description on Dietetic and Nutritional Services.

DOT Code: Public Health Educator 079.118-010

For further information, write to:

Society for Public Health Education, Inc.
655 Sutter Street
San Francisco, California 94102

School Health Educator

The main concern of the school health educator is, as the name implies, the teaching of children and youth—whereas the public health educator's main focus is upon community action. The school health educator helps children and young people develop the knowledge, attitudes, and skills they need to live healthfully and safely. They cooperate closely in this task with the physician and nurse serving the school, as well as with all other teachers and service personnel in the school. Usually, too, they participate in community health activities as representatives of the school health education program.

Health education has a place all the way from nursery school and kindergarten through high school and on into college, because it deals with day-to-day living. It is health education when 5-year-olds learn to eat new foods, and also when high school seniors make a field survey of the health services available in their community.

Depending on the school system—and on the school grades covered—the health courses usually include such subject matter as family life education, first aid, safety education, choice and use of health services and products, nutrition, personal hygiene, and community health. Health courses include the principles of mental health and good human relations, as well as of marriage and family life.

The school health educator may have even broader responsibilities as a health coordinator. The school health coordinator may work in a single school or in an entire school system; he furnishes leadership in developing and maintaining an adequate, well-balanced health program and in getting all groups interested in the health of the school child to work together effectively.

Training and Qualifications

The school health educator needs 4 years of college education leading to a bachelor's degree, with a background in the biological, behavioral, and social sciences, and in health education. Increasingly, a master's degree is required.

The school health educator must meet the regular certification standards for teachers in his State. Generally, these call for 15 to 20 credits in professional courses in the school of education. These courses usually include educational philosophy, the techniques of teaching, child growth and development, educational psychology, and the like. A period of internship may also be required. But these standards vary from State to State, and the student is advised to look into requirements in the area where he expects to work.

For the school health educator, the advanced degree is usually in the field of health education. A doctor's degree often is required for college teaching positions.

The school health educator should have an aptitude for scientific and social studies. In general, personal qualifications for this educational specialist are pretty much like those for the successful teacher in any field. It's important to like working with children and young people; and to have patience, a sense of humor, good judgment, and emotional stability.

Opportunities and Prospects

Though the young teacher just out of college does not ordinarily start out as a full-time school health educator, more and more systems are recognizing the need for the full-time teacher of health education.

This makes it advisable to have a second teaching field—for example, social studies, physical education, or science.

There are few positions for health educators in the elementary schools, but an increasing number of high schools—and colleges—are searching for well-qualified teachers of health.

Related Occupations

As noted earlier, the school health educator has many of the same interests and objectives as the health educator. But since the duties of the school health educator are primarily those of the teacher, professional contacts are for the most part with coworkers in related fields of education—with one exception: the school nurse.

For further mention of the school nurse, see the description of school health in the chapter entitled "An Overview of the Health Field" and in the description on Nursing and Related Services.

For further information, write to:
American Association for Health, Physical
Education, and Recreation
National Education Association
1201 16th Street, N.W.
Washington, D.C. 20036

Health Information and Communications

Americans are well informed about health, medicine, and science. This is part of the American way of life. The people expect to be informed about these subjects as they do about anything else which has a direct bearing on their lives and well-being. The newspapers, magazines, and broadcast media consider it their business to provide their readers and audiences with this information.

In addition, there are organizations and agencies which have a professional interest in keeping the public informed in this area—the health organizations and agencies, public and private. They know that people who are informed about current developments and discoveries in health and medicine will show greater initiative in getting medical, dental, and preventive care for their families and themselves.

These agencies and organizations also want to keep the public informed in order to keep it interested and involved in the initiation and support of adequate health care facilities in the community—hospitals, clinics, group health services, neighborhood health centers, well-baby clinics, mobile screening units, and the like.

All this—keeping the public informed for these purposes—is the domain of the health information specialist or communicator.

The general public is only one of the audiences for health information. There are others, more specialized audiences. The members of the various health professions themselves need to be kept informed about what is going on in their own fields. Part of this job—keeping these professionals informed—belongs to the health information specialist. Another part, the communication of technical information and knowledge, belongs to the technical writer—the "writer for the trade," so to speak.

Working with the health information specialist and technical writer is the medical illustrator, the graphic arts specialist who produces the drawings, photographs, models, and other visual representations which clarify and supplement the message of the writer.

The health occupation most closely related to the health information specialist is the health educator. (See the section on Health Education.)

Science Writer

The science writer is an experienced journalist who specializes in scientific subjects, including medicine and health. He may write for newspapers, magazines, radio, television, or for scientific or professional publications. It is his job to acquaint his readers with what is happening in the fields of science and medicine—new treatments for cancer or heart disease, improved surgical techniques, research gains for the mentally ill, and the like. The science writer not only reports but also interprets. Unlike the sports writer, say, whose reader is already familiar with the subject, the science writer in the health field must explain new and complex technical matters in nontechnical terms so they are readily understandable to the reader. The critical nature of his subject matter means, also, that he must be objective and accurate in presenting the facts. The physicians, scientists, and health administrators to whom the science writer looks for information will hesitate to talk freely unless they know he is competent and trustworthy. The confidence of the reading public depends on his caution and integrity.

Many of those working in this field today began their careers as general news reporters and then, through personal interest and additional training, gradually worked into specialty. Necessary background for science writing consists, first, of a good general education and training in journalism, and, secondly, of knowledge of the physical and social sciences (chemistry, physics, physiology, psychology, and sociology). The beginner must prove his worth as a general writer and journalist before he can begin to specialize in science writing.

Since the science writer works with people and with organizations representing every conceivable branch of science and medicine, his own knowledge must be broad enough to give him at least a speaking acquaintance with the health sciences generally. The writer might interview a neurosurgeon one day, a biochemist the next, a nuclear physicist the next. He must be able to ask pertinent questions, weigh the value of the answers, obtain additional supporting evidence, and, finally, he must know how to present the facts so that they cannot be misunderstood.

Four years of college and a bachelor's degree is a minimum educational requirement. English or journalism are the preferred majors, and concentration on science courses is advisable. A real grasp of the subject and the ability to write it interestingly are necessary and this takes training, as well as aptitude and experience.

The writer—man or woman—who is interested in science and who has a good judgment, curiosity, a love for research, and the ability to write well, can find this a rewarding and exciting profession.

The demand for science writers is increasing and the field is expanding, with semitechnical publications and trade papers offering additional opportunities.

As in the news field generally, salary and working conditions vary greatly. Some science writers freelance; some serve as editors as well as writers on magazines and in publishing houses; some have staff positions as information specialists in scientific and health organizations. (See Health Information Specialist below.)

Health Information Specialist

The health information specialist is employed by a health organization as its news link with the public. He, too, is a science writer. Information specialists work in practically every kind of health institution, public and private, national, State, and local.

The people who support health programs, either through voluntary contributions or taxes, are entitled to know what their money is helping to accomplish. It is the business of the information specialist to keep them informed.

The health information specialist has a creative job. He does more than transmit information. He has to transmit it in such a way that it will reach and attract as many people as possible. His stock in trade is his skill in communicating, and he uses every medium available—leaflets and other publications, newspapers, magazines, and often radio, television, exhibits, and motion pictures.

The experienced information specialist in a sizable agency usually heads a department or section of public information with several staff members. Each of these staff members would have responsibility for one particular channel of information—say, press, radio, television, or exhibits. Other staff members may deal primarily with scientific or general publications. Often, too, a large office has several editorial assistants who may do abstracting or library research, or prepare first-draft material. The smaller the organization, the smaller the staff, and in a small organization, the information specialist may run a one-man show.

The information specialist works closely with the organization's executive and other members of its staff, advising them on the news value of their programs and on interpreting them to the public. Though he could hardly cover all these items in any one day, his typical weekly schedule might go something like this: advising the head of the agency on the need for a particular publication, which may take any form from a scientific report to a comic-book-style primer on health facts, and then writing it; working with a reporter for a newspaper, or for radio or television, to see that the facts are properly gathered for a news article on some feature of the agency's work; planning an exhibit; cooperating with other agencies, public or private, that are working in allied fields.

The information specialist must be skilled and imaginative in creating understanding of health information and of the aims and accomplishments of his organization. Except for the government agencies, qualifications and training requirements differ widely. Federal civil service examinations, which are competitive, call for a college degree or its equivalent, and for a certain amount of experience in communications, depending on the responsibilities of the position.

The health information specialist should plan on 4 years of college and a bachelor's degree. It would be helpful—but not essential—to take a major in journalism, backing it up with courses in biological, medical, and social sciences.

Since newspapers play such a large part in conveying information to the public, information specialists working today are likely to have newspaper background. Many also have experience in radio and television. Without at least some firsthand knowledge of this kind, it would be difficult to get a start in information work.

Salaries vary greatly, depending on the kind of organization, its size, its location and scope—national, regional, or local. In general, salaries in information work are in line with other positions requiring comparable qualifications.

No two information jobs are alike. But, in addition to technical skills in writing and other forms of communication, they require, in common, variability and the ability to work under pressure, schedules, and deadlines. These jobs also require a great deal of digging for facts and other routine work that may not be apparent in the finished product.

Those to whom a career as a science writer or health information specialist sounds appealing might also be interested in public health education as described in the section on Health Education. See also the statement on Public Relations Director in the section on Hospital and Health Services Administration.

DOT Code: Science Writer 139.088-033

For further information, write to:
Council for the Advancement of Science
Writing, Inc.
201 Christie Street
Leona, New Jersey 07605

Technical Writer

The technical writer and the science writer both deal with the same general subject matter, but each focuses on a particular group of readers. The technical writer's specialty is writing about scientific and technical developments primarily for "insiders," that is, scientists and related technicians involved in scientific activities. (In contrast, the science writer, as pointed out above, specializes in interpreting scientific and technical developments for "outsiders," that is, the general public.)

Technical writing as a specialized career is a direct product of scientific progress and the rapidly multiplying need for communications within scientific fields. Scientists are always in some degree their own communicators; the writing of scientific papers is one of their established functions. But not all scientists are proficient in writing skills, and even if they are, they do not have time to meet all the needs for scientific and technical information. Therefore, the need for the technical writer. Following are some of the tasks the technical writer might be expected to perform.

Prepare reports, either for administrative purposes or for publication in scientific journals on such matters as new or proposed projects, newly developed techniques and instrumentation, or the proceedings of scientific conferences.

Prepare instruction manuals for various kinds of laboratory technicians.

Prepare the equipment specifications, contract proposals, and other "business" documents that serve as connecting links between the scientist and the man who will manufacture or utilize his latest technological product—whether a new drug or an improved device for diagnosis or surgery.

Technical writing attempts primarily to inform the reader about something it is his business to know. The emphasis is on specific data often spelled out to the last detail. Such writing may often seem "dry," but it is admirably tailored to its purpose to provide a clear, complete, and accurate presentation, no matter how complex the subject.

Technical writers must be thoroughly familiar with their subject. This assumes a substantial background of technical information and intensive study of the area to be covered. They may review technical books, journals, and working papers including mathematical data; collect preliminary sketches, graphs, blueprints, and photos; interview scientific personnel; and tour laboratories, hospitals, or environmental health field stations. They then prepare one or more rough drafts and these are discussed with the scientists involved and revised until all gaps in information have been plugged and all possibilities of misunderstanding or inaccuracy ironed out. In some cases, technical writers assist in preparing such visual aids as charts, photos, and diagrams to illustrate or clarify points that cannot be as effectively brought out in the copy.

Some technical writers specializing in the health sciences work for universities, foundations, Federal agencies, and other organizations with research programs. Others are employed by professional societies, scientific and medical publishers, manufacturers, and other businesses with health-related interests. A few experienced technical writers also work on freelance assignments from a number of different organizations.

Although there are no hard and fast educational requirements, most organizations are unlikely to employ beginners who do not have a bachelor's degree. Employers stress the importance of combining training in both science and writing skills. This could be provided by a B.S. in one of the basic sciences with a minor in languages and journalism, or a B.A. in English or journalism with a minor in science. Experience in student publications helps. Though graduate education is not a formal requirement, some technical writers take advanced degrees in one of the sciences. Many of them take advantage of the short-term seminars and workshops offered by universities.

Technical writers should not only be able to write clearly and accurately, but should be adept at digesting complex resource material.

Beginning workers are often assigned as assistants to experienced staff members. Their work might include library research and summarizing pertinent information, writing captions and short paragraphs, and such routine tasks as proofreading. As they gain experience, they are assigned to independent projects.

Reflecting the growth throughout all of science, the demand for first-rate technical writers, already great, is expected to increase over a considerable period.

DOT Code: Technical Writer 139.288-014

For further information, write to:
Society of Technical Writers and
Publishers, Inc.
1010 Vermont Avenue, N. W.
Suite 421
Washington, D. C. 20005

Medical Illustrator

At one time, the work of the medical illustrator was limited to drawings and charts for medical journals, textbooks, monographs, and similar publications.

Today the medical illustrator's activities have a much broader scope. He interprets medical information by many kinds of visual presentations. He may use drawings, models, photography, exhibits, and television. He works with physicians, research scientists, educators, authors, and others to record facts and progress in many health fields.

Illustrators may work with specialists in subjects such as anatomy (structure of the body), pathology (study of diseases), and embryology (development of the body). Medical education relies heavily on the medical illustrator's work. The health professions depend on the illustrator to produce visual presentations for their own use and for the public. Scientific illustrations are now widely used in general magazines, professional journals, textbooks, exhibits, and pamphlets.

The medical illustrator's art combines minute accuracy with technical versatility. He works in many art media—water color, crayon, pen and ink, air brush, pencil, wax, plaster, plastics.

Qualifications

Students intending to become medical illustrators should be science minded—with a creative interest in science and with the scientist's capacity for observation and study. They must have the ability to observe with accuracy, visualize with imagination, and persevere in application. Medical illustrating is not a career for everyone interested in art. It requires these special combinations of talent.

Training

A limited number of schools offer approved programs of study in medical illustration. Some schools require a college degree; all require extensive college training in art and the biological sciences.

These programs of education for medical illustration take from 5 to 7 years beyond graduation from high school. High school studies should include biology, other science courses, and art. There are only four U.S. medical colleges that have accredited schools of medical illustration. These run a minimum of 20 months or 2 academic years. They cover gross and microscopic human anatomy, pathology, embryology, and, in some instances, neuroanatomy and physiology. Training is also given in various media and techniques applicable to medial illustration.

Prospects

Medical artists either work in a medical environment (hospital, clinic, medical school, research institute) or they free lance. Some combine the two.

The student will be well advised to explore this field carefully before deciding to study medical illustration. The enrollments at the few accredited schools are kept extremely small; only two to six students are accepted a year at each school. Of the many who apply, only the most talented and best qualified are accepted. It must also be kept in mind that the training is long and the opportunities usually limited to large cities or smaller cities with established medical centers.

Medical art has a long history, but it is only in the last few years that the Association of Medical Illustrators has established minimum accreditation standards for the professional training of a medical illustrator. Only four U.S. schools thus far have received accreditation. They are the Medical College of Georgia (Augusta, Georgia), University of Illinois College of Medicine (Chicago, Illinois), Johns Hopkins University School of Medicine (Baltimore, Maryland), and University of Michigan School of Medicine (Ann Arbor, Michigan).

DOT Code: Medical Illustrator 141.081-050

For further information, write to:
Association of Medical Illustrators
Medical College of Georgia
Augusta, Georgia 30902

Health Statistics

One of the most important functions of the statistician, in any field, is to gather data on a particular situation, analyze this data to see if there is a particular trend, and from this predict what the situation will be in 1, 2, 5, and 10 years from now.

Securities statisticians study trends of stocks, and attempt to predict, on the basis of present and past performance, how the stock will do next week or next month.

The statistician working in the food production business attempts to learn what the demand is for a particular food, in different parts of the country or among different populations or socioeconomic groups, so the producer can determine how the distribution pattern should be changed to fit different demands in the different areas.

The statistician in the health field is concerned with trends in disease, in health, in disease prevention, as they exist in different populations, at different times, and under different conditions.

Public Health Statistician

To distinguish him from statisticians working in other fields, the professional statistician who devotes his time to health work is usually called a public health statistician or public health analyst.

Most public health statisticians or analysts are employed by State or local health departments or by Federal agencies, but an increasing number also work in voluntary health agencies, industrial organizations, medical schools, and scientific research institutions. Some serve as teachers and consultants in schools of public health.

The public health statistician, or public health analyst, is concerned with the incidence of a particular disease—polio, measles, influenza—from month to month and year to year, and with how the incidence varies for different age groups, different localities, or different ethnic or socioeconomic groups.

He will study the decrease in death rates, increase in birth rates, and other such data to work out "life expectancy" tables—predictions on the number of years which the average American male or female will live.

He will tabulate the "vital statistics"—births, deaths, marriages—for the permanent record, so comparisons can be made for different years, sections of the country, ethnic populations, and so forth.

Another major function of the public health statistician is to help in the planning and evaluating of health services.

One special aspect of this work is called biostatistics or biometrics. The biostatistician designs research projects and research techniques to answer questions concerning disease and health. A health agency may want to know, for example, whether one particular vaccine for polio is better than another; or it may want to know whether fluoridation of the water supply will be of benefit to the city's population. The biostatistician works out the research design and statistical testing devices which will answer these questions.

For the public health statistician, education starts with the regular 4 years of college and a bachelor's degree with a major in statistics. Some courses in mathematics, elementary statistics, and the physical, biological, and/or social sciences are required. Experience in writing and speaking is useful, too, since an essential part of the statistician's job is the preparation of clear, understandable, and interesting reports. Students who want to advance in the public health field are advised to get practical experience for a few years after college, and then to go on with graduate work. For those interested mainly in analytical statistics, the best place for advanced training is a school of public health which has courses leading to a master's or doctor's degree. This graduate work will take either 1 or 2 years for a master's degree, and 3 or more for a doctor's degree. For those looking toward biostatistics, it may be better to take graduate training which stresses statistics as it relates to biology and other medical or physical sciences.

Some training or experience in computers is also highly desirable. Today a substantial part of the processing and analysis of data is accomplished with the aid of electronic equipment. It is not necessary that the statistician be able to write programs or to operate a computer, but his value is increased substantially if he has sufficient understanding of the capacity and role of computers to see that they are utilized efficiently on statistical projects.

The young man (or woman) just out of college can expect to start as a junior statistician or statistical clerk. He will probably supervise clerical or tabulation workers, make simple analytical studies, and prepare some reports. Some health departments encourage beginners to get further clinical training during summer months. Others have developed in-service training plans.

Statistical Clerk

Under supervision, this member of the statistical staff handles a variety of clerical and statistical jobs. For example, he may abstract material from technical reports and put it on special cards which can easily be coded and compiled. Other duties may be to help analyze statistical data, maintain files of records and worksheets, and verify figures and computations.

A solid grounding in high school mathematics through intermediate algebra is usually sufficient for anyone who wishes to become a statistical clerk. However, there is little chance for advancement without a college degree.

Related Occupations

The career most closely related to health statistics is that of the public health program analyst. (See the section on Hospital and Health Services Administration.)

Health statisticians also have relationships with both economists and sociologists. For each of these social sciences, see the appropriate section.

DOT Code:	Public Health Statistician	020.188-048
	Statistical Clerk	219.388-258

For further information, write to:
National Center for Health Statistics
U.S. Public Health Service
Department of Health, Education,
and Welfare
5600 Fishers Lane
Rockville, Maryland 20852

Hospital and Health Services Administration

Though the hospital is a familiar community landmark, its administrative services are like the hidden part of an iceberg—much more extensive than can be seen on the surface.

To care for the medical and other personal needs of the patient, the hospital must provide a wide range of medical, surgical, nursing, social, laboratory, and technical services. Aside from the care of the patient, the hospital also carries on research and programs of training for professional personnel. In addition, it is involved in the promotion of community health.

These many important functions are dependent on the hospital's administrative functions and staff. Without them the hospital could not operate.

It is the responsibility of the hospital's administrative branch to:

- Employ, train, manage, and pay the various categories of personnel.
- Feed and house patients.
- Purchase the necessary supplies and services.
- Maintain the physical plant and utilities.
- Supply clerical, communication, and transportation services.

Hospital Administrator

Whether the hospital is large or small, it must have an executive or administrator to take overall charge of the institution and to coordinate all its services.

The administrator's task is to see that all the hospital's objectives are carried out. He is directly responsible to the hospital's governing body, a group of community-minded men and women who set the broad policies under which the hospital operates.

The administrator is responsible for developing an effective team of physicians, nurses, dietitians, pharmacists, housekeepers, engineers, and others who work in the hospital and for seeing that adequate supporting facilities, services, and equipment are available. He holds a community trust; it is his obligation to see that the hospital provides an acceptable health services program.

The administrator must be well informed about all hospital functions and services and equipped to select and supervise the staff members who are in charge of all its departments. He must be aware of community health needs and health planning. He is concerned not only with the professional services needed to provide patient care services but also with those required for business and office operations, personnel management, public relations, volunteer service, purchasing, engineering and maintenance, and housekeeping.

He must be able to cope with the special situations and emergencies which arise daily in every hospital; he must be prepared to handle unexpected demands practically around the clock.

The administrator may have one or more assistants. In the larger hospitals, the administrator's executive staff is in charge of a major aspect of hospital service. The assistants frequently carry on special studies and prepare reports to help the administrator make his final decisions or recommendations to the governing board.

The young man or woman who wants to become a hospital administrator needs the basic capacities required for administrative work in any field. He or she should also have good health, vitality, the ability to work under pressure, and a sincere interest in hospital work.

Young people who want to enter this field can head directly toward their goal. Requirements include college graduation followed by a master's degree in hospital administration. These graduate courses are offered at 34 universities in the United

States, Canada, and Puerto Rico.

College work should be planned to include courses in economics, finance, statistics, psychology, and personnel administration. It would be wise to write several schools of hospital administration for advice about required or recommended subjects.

The graduate programs consist of a 2-year course of study. In some cases, a year in "administrative residence" in a hospital is included. Graduates of the 2-year program receive a master's degree in hospital administration.

Most hospitals today, especially the larger ones, prefer to draw their administrative staff from the graduates of these schools. Beginners with a master's degree in hospital administration are usually appointed as administrative assistants or as hospital department heads. Both government and nongovernment institutions offer such positions.

To help hospital administrators keep current with new developments, programs of continuing education are given in many parts of the country under the sponsorship of the American College of Hospital Administrators. Institutes and other education meetings are also held by the American Hospital Association.

For further information, write to:
American College of Hospital
Administrators
840 North Lake Shore Drive
Chicago, Illinois 60611
or
Association of University Programs
in Hospital Administration
One Dupont Circle
Washington, D.C. 20036

Controller or Business Manager and Staff

Business efficiency and prudent management of finances are essential in running a hospital. Those responsible for handling the hospital's monies and finances hold extremely important positions.

The head of the hospital business office is called the controller or business manager. The title of controller usually implies responsibility as adviser on hospital financial policy, as well as manager of the business office. The title of business manager applies when the position is limited to management, with the advisory responsibility handled either by an assistant administrator or the administrator himself.

The controller is responsible for receiving and depositing all monies that come in. He approves payments of salaries and other expenditures, and maintains detailed records of all incoming and outgoing transactions.

The controller or business manager should have a bachelor's degree, usually in accounting or business administration. His post-college business experience should include at least 3 years of responsible accounting work in an accredited hospital; at least 2 of the years should be in a supervisory position.

Accountant: As one of the administrative people responsible to the controller, the hospital accountant reviews and prepares periodic financial and statistical reports, including accounts of cash receipts, payroll and other expenditures, and patient accounts.

He should have a minimum of two semesters in college-level accounting or 2 years' experience in hospital accounting. The best preparation is a 4-year college program leading to a degree in business administration. A college graduate aiming to become a hospital controller can get good beginning experience by starting as an accountant.

Credit Manager: This member of the business office staff supervises and directs the hospital's credit and collection activities. It is part of his job to explain the hospital's policy on credit and collections to patients, to find out about their financial situation, and to help them work out payment plans. Because he deals with patients, he needs to be diplomatic as well as businesslike. Because he manages important financial operations, he must have good judgment and supervisory ability.

The hospital credit manager must be a high school graduate, and some college education is desirable. Courses should include business administration, accounting, and some business law.

Cashier: The cashier is the person who receives payments from patients or their families. In addition to maintaining a working cash fund and preparing bank deposits, the cashier may have additional duties as a clerk, stenographer, or bookkeeper—or even, in smaller hospitals, as credit manager. A high school or commercial school education with emphasis on typing and bookkeeping is required. He should be experienced in handling money and dealing with people.

Admitting Officer: In many hospitals, the admitting department is also under the supervision of the controller. The admitting officer and his assistants assign incoming patients to rooms and notify the proper hospital department of admissions. For this purpose the admitting officer keeps an up-to-the-minute record of all room assignments, transfers, and departures.

The admitting officer must have a general knowledge of hospital procedures and of the social and economic conditions in the community. He should have aptitude in interviewing and be able to determine a patient's financial status. He should also have a warm and understanding personality.

Education requirements are flexible. Two years' experience in a hospital or social agency is usually required.

In larger hospitals, an assistant admitting officer or admitting clerk shares responsibility with the head of the department. These assistants usually do a good deal of clerical work and should be good typists. Although a college degree is not required, it is an asset for those seeking advancement to the position of admitting officer.

While only the largest centers can afford their own computers, many medium-sized institutions are able to buy time or share facilities with other hospitals. While use of computers is not limited to accounting and billing functions of hospitals (some use them in medical research and diagnosis work as well), this is the function they are often initially applied to. This sets the stage for growth in jobs combining both medical and computer knowledges.

For further information, write to:
Hospital Financial Management Association
840 North Lake Shore Drive
Chicago, Illinois 60611

Personnel Director and Staff

One of the personnel director's major responsibilities is to determine whether applicants for hospital positions have the qualifications and capacity for a particular job. To provide a base for such determinations, he must analyze the duties involved in each hospital position and the qualifications required to perform these duties. He must have a thorough understanding of the hospital's inner workings from top to bottom.

But the personnel director does a great deal more than this. He will be concerned, for example, with working conditions, time schedules, pay scales, provisions for sick leave and vacations, pension plans, and other "fringe benefits." He must also concern himself with each employee's adjustment to his work and the personal satisfaction the job provides for the employee.

Since most of his dealings are with people, the personnel director must be a good listener as well as a good talker, must understand human behavior, and must have an open mind for other people's ideas.

A personnel director should have a college degree, preferably with a major in personnel administration, business administration, labor relations, or a related field. At least 1 year of personnel experience is ordinarily required before assignment to the post of personnel director.

In a good-sized hospital, there may be a number of professional positions under the personnel director—for example:

- The employment manager—who interviews and screens job applicants.
- The employment interviewer—who conducts the initial interview.
- The job analyst—who collects, analyzes, and develops the information needed as a basis for employee selection and placement.
- The training supervisor—who is responsible for coordination of the hospital's employee development activities.
- The salary and wage administrator—who is responsible for job classifications, job evaluations, and position control.

In general, the requirements for such positions are like those for personnel director. This kind of experience often paves the way for advancement to head of a hospital personnel department.

Public Relations Director

Every hospital has many "publics" inside and outside its own walls—among them, its medical staff, employees, and volunteers; its patients, together with their families and visitors; and the people of the community. The hospital's public relations director deals with all of these "publics." He develops a communications program to help each of these groups understand the hospital, its services, and its goals.

To promote better understanding, the public relations director may undertake a variety of activities. He may write and produce a hospital magazine; prepare booklets explaining certain facets of the hospital to patients, visitors, and salesmen who deal with the hospital; or arrange tours and open house events for patients, their families, and special community groups.

He must maintain good relations with the news media in the community (newspapers, radio, and television) and keep them informed of hospital activities. He may provide them with information about emergency cases, about well-known individuals who may be patients, and about the hospital generally. He may also offer suggestions for special articles or programs explaining hospital services or accomplishments.

A college degree with a major in public relations or journalism is the recommended educational background for work of this kind. Both men and women are employed in this post.

More hospitals are adding a public relations officer to their staff and the outlook for this occupation is very good. Opportunities for beginners with limited experience are best in the larger hospitals where the director has one or more assistants.

Director of Volunteer Services

The director of volunteer services is responsible for the entire in-service volunteer program. He recruits volunteers, assists in their orientation, sees to their training for the assigned job, and helps to evaluate their performance. Since he matches volunteers to volunteer jobs, his work is in many ways similar to that of the personnel director.

The director of volunteers should be well acquainted with the work which the volunteers are asked to do, and understand the special role the volunteer plays in helping the sick or disabled patient. The volunteer may be asked to do little more than help with food trays or help the patient select books from the library cart. On the other hand, he may be involved in some aspects of occupational therapy, vocational therapy, music therapy, and so on. The director of volunteers must be sensitive to the volunteer's personal qualities that can be most beneficial to the sick or disabled patients. On the other hand, he must also be sensitive to weaknesses or personality problems that may make the volunteer unsuited for a particular task. A capacity for leadership is essential, and abilities in writing and public speaking are desirable.

A college degree, preferably with a major in sociology, psychology, or management, is recommended. Courses in communications skills (rhetoric, composition, and public speaking), business procedures, personnel administration, community organization and problems, and public relations are valuable. Prior experience as a volunteer in a health care facility is helpful, as is executive or administrative experience in community organizations.

A starting position could well be as a secretary or assistant in the volunteer department, personnel office, or public relations office of a large health care institution. Some hospitals provide in-service training for the new director of volunteers, either in their own volunteer department or in that of a nearby hospital.

Director of Office Services and Staff

Most of the administrative and clerical jobs in a hospital are located in the hospital's central business office, under the direction of the director of office services. These would include secretarial and typing services, bookkeeping and business machine operations, central files, telephone switchboard, duplicating, mail and messenger service, and the like. Depending on its size, this office may operate as a single unit under the immediate supervision of the director of office services. Or it may have separate units (as for typing, bookkeeping, central files, etc.), each under a supervisor who in turn reports to the director.

The basic requirements for such positions are the same in a hospital as elsewhere. Young people who have taken business courses in high school or learned office skills through on-the-job experience should be qualified for a hospital office job.

It is possible to work up to a supervisor's job. The night courses offered by many business schools, technical institutes, and colleges can be of help in working for advancement.

Along with these opportunities in the hospital's central business office, there are other openings for administrative workers—for example:

Secretaries: The hospital administrator and the department head, in a good-sized hospital, have secretaries assigned to them individually. The secretary frequently speaks for her superior in dealing with other hospital people or with the public. She must be well informed, courteous, efficient, and able to take responsibility. Junior college or college background is helpful in obtaining top secretarial positions.

Receptionists: A receptionist works at the entrance desk of a hospital or clinic. She is usually on the staff of the admitting office. It is her job to answer inquiries of people coming into the hospital and to direct them to the place they want to go. Because she deals with people who are ill and with their families and friends, a pleasant personality and a calm reassuring manner are important. Typing ability is required and it may also be necessary to operate a telephone switchboard.

Stenographers and Clerks: In addition to the stenographic and clerical jobs in the central office, good-sized hospitals usually assign stenographers and clerks to various departments. These jobs include, for example, the dietetic clerk, the housekeeping clerk or secretary, the ward clerk in a nursing station, and the typist in the medical records department.

Purchasing Agent

The hospital purchasing agent buys equipment, supplies, and outside services. He must be familiar with the thousands of goods and services needed in the operation of a hospital. He should be an astute shopper because he is expected to make all his purchases at the most favorable price. Along with his other duties, he directs the inspection of products when delivered, approves payment, supervises storage control and the issuance of supplies to the staff. In large hospitals, the purchasing agent may have at least one assistant, and an assistant's job would be a good start for a beginner.

Since many salesmen come to see him, the purchasing agent should be skilled in meeting people. He needs a sound knowledge of economics and an ability to evaluate goods and services.

This position requires at least a high school education and 5 years' experience in purchasing. A college degree with a business administration major is desirable and may be a requirement in larger hospitals.

Working under the purchasing agent's direction may be a stockroom manager or storekeeper, who is in charge of handling and storing all the materials, supplies, and equipment used in a hospital. He keeps records of supplies and their distribution, and develops a stockroom procedure for making and handling requests. High school graduation is the minimum educational requirement, and additional courses in business arithmetic and bookkeeping are useful.

In most stockrooms, the manager is assisted by a stock clerk who does most of the actual handling of supplies and deliveries.

Hospital Engineer and Maintenance Staff

The hospital's chief engineer is responsible for the repair, maintenance, and upkeep of equipment,

The hospital purchasing agent, center, reviews a storage control list.

buildings, and grounds. Lighting, heating, plumbing, and elevator service are some of the services for which he is responsible.

His staff includes maintenance people with a variety of skills. He must be well informed about all the skills coming under his jurisdiction, as well as the equipment and materials required. As part of his supervisory responsibility, he develops job specifications, make assignments and sees that they are carried out, and keeps personnel and supply records for his department.

Whenever hospital remodeling or expansion is being planned, the engineer will probably be called in by the administrator to advise on the engineering aspects of the project. When construction gets underway, he represents the administrator in dealing with contractors.

Qualifications for a hospital engineer include an understanding of the hospital plant and equipment and familiarity with mechanical, electrical, and building repair jobs. He must be able to direct others in carrying out their work and to check on their workmanship.

In larger hospitals, a college degree in electrical or mechanical engineering may be required. The minimum educational requirement is high school graduation. A considerable background of practical experience is also necessary. Many chief engineers have served apprenticeships in the building trades—for example, as electricians, carpenters, or stationary engineers. Others get their experience by serving as an assistant engineer in a hospital.

Maintenance workers (large hospitals usually have a full complement) include the following:

- *Stationary engineers*—operate stationary boiler equipment.
- *Plumbers*—install and repair piping systems and fittings for water, steam, and drainage.
- *Electricians*—install, test, and repair electrical light and power distribution circuits, including those required for specialized hospital equipment.
- *Carpenters*—construct and repair furniture or fixtures, and build special equipment according to individual specifications.
- *Masons, painters, plasterers, groundskeepers, and others.*

Executive Housekeeper and Housekeeping Staff

The tasks supervised and carried out by the hospital housekeeping department include window and wall washing, floor polishing, general cleaning, laundry, mending of bed linen and clothes, and, on occasion, redecorating rooms.

Cleanliness is especially important in a hospital to avoid the spread of infection. The executive housekeeper directs this large-scale cleanliness campaign. She establishes standards, work methods, and schedules; hires and trains all housekeeping personnel; and inspects the work to make sure standards of cleanliness are met.

Some beginners today hold a college degree with a major in business administration, institutional management, or home economics. As hospital management increases in complexity, future requirements for the post of executive housekeeper may call for a bachelor of science degree in institutional management. Men as well as women hold this job.

Housekeeping workers do not require any specialized training. Most hospitals provide on-the-job training for them. They include:

- *Porters*—clean and wax floors, wash walls and windows, and perform similar tasks.
- *Maids*—keep assigned areas of the hospital clean.
- *Linen-room attendants*—store, inventory, mark, and issue linens.
- *Clothes-room workers*—care for the clothing of patients during their hospital stay.

For further information, write to:
National Executive Housekeepers
Association
Business and Professional Building
414 Second Avenue
Gallipolis, Ohio 45631

Laundry Manager and Laundry Workers

Many hospitals maintain their own laundries. Though the executive housekeeper sometimes supervises this operation, it is usually set up as a separate unit under the direction of a laundry manager. The manager supervises the washing and finishing of laundry, and directs the training of new laundry workers. In some hospitals, he is also responsible for preparing sterile packs of supplies for use in surgery, delivery rooms, and nurseries.

Related Occupations

Among the many hospital professions covered in separate sections, there are two which are usually considered part of the hospital's basic administrative services. See:

- Library Services in the Health Field
- Medical Records

For administrative occupations in health departments and voluntary agencies, see the previous section.

DOT Code:	Administrator, Hospital	187.118-062
	Accountant	160.188-010
	Admitting Officer	237.368-010
	Controller	186.118-014
	Director, Public Relations	165.068-022
	Employment Interviewer II	166.268-018
	Executive Housekeeper	187.168-050
	Job Analyst	166.088-010
	Laundry Foreman	361.138-010
	Manager, Credit and Collection	168.168-050
	Manager, Employment	166.168-025
	Manager, Personnel	166.118-022
	Purchasing Agent	162.158-102
	Supervisor, Training	166.228-018

For further information on selected occupations covered in this section, write to:

American Hospital Association
840 North Lake Shore Drive
Chicago, Illinois 60611

Association of University Programs
in Hospital Administration
One Dupont Circle
Washington, D.C. 20036

The National Executive Housekeepers
Association, Inc.
Business and Professional Building
414 Second Avenue
Gallipolis, Ohio 45631

Inhalation Therapy

The administration of oxygen for various types of illness has been a standard medical procedure for many years. As medical technology has advanced, many refinements and improvements have been made in the procedure for administering oxygen and other therapeutic gases so as to control and regulate dosage precisely and to adapt the treatment to the patient's exact medical and physical condition at the time.

The increasing precision of the process and complexity of the equipment has required that the therapy be given by a highly skilled person especially trained for this function. As a result, the health occupation of inhalation therapist has emerged in the past several years. This is now one of the most rapidly growing of all the allied health occupations.

Inhalation Therapist

The inhalation therapist sets up and operates various types of therapeutic gas and mist inhalation equipment, such as respirators, tents, masks, catheters, cannulas, and incubators. He administers through these devices prescribed doses of medicinal gases and aerosolized drugs to hospitalized patients.

The inhalation therapist receives from the physician a prescription specifying the type of therapy, the type of medication, and the dosage. He must then determine the most suitable method of administering the inhalant, the precautions to be observed, and the modifications that may need to be made in the method in order to comply with the physician's exact requirements.

The therapist then explains to the patient what the inhalation treatment will consist of, so as to enlist his cooperation and allay anxiety. When the equipment is brought to the bedside, the therapist instructs the patient as to breathing procedure, and then proceeds to arrange the tent or hood, or apply the face mask, or insert the cannula or catheter. Then he starts the flow of gas from the "bottle" or other source, setting the controls to regulate the flow at the required level.

As the therapy is in process, the therapist observes the patient to detect adverse reactions, notifying the nurse or doctor should these develop. He also reads the equipment gages to insure that specified pressures are being maintained.

The inhalation therapist also operates the Intermittent-Positive-Pressure-Breathing Machine (IPPB) to deliver medicinal gases and drugs in aerosolized mist concentration to the patient's respiratory system.

Some inhalation treatments run from 5 to 15 minutes. Others are considerably longer, and some are continuous. While the treatment is in process, the inhalation therapist observes the patient's comfort and general condition, noting rate of respiration, pulse, and the patient's color (pallor or flushing). He may also be required to conduct pulmonary function tests of various kinds, including lung volumes, gas flows, and blood gas analysis.

In addition to these direct therapeutic functions, the inhalation therapist is also required to perform several other related duties. He must:

- Keep the equipment clean, sterile, and in good working condition, and order repairs as needed.
- Order new equipment and see that it is properly stored.
- Maintain adequate supplies of oxygen and other gases.
- Conduct classroom and on-the-job instruction in inhalation therapy.
- Keep current with the latest developments by reading the literature, and attending meetings.

In small hospitals, there may be just one inhalation therapist; working under the direction of a physician, he will be responsible for all the duties that have been described. In larger hospitals, there may be an inhalation therapy supervisor, together with a number of inhalation therapists, trainees, and clerical help.

Education and Training

Education, training, and experience range from high school education with courses in biology and chemistry, along with more than a year's on-the-job training under strict supervision, up to and including a B.S. degree, depending upon the position desired. For the beginning high school graduate who cannot go on to college and complete a bachelor's degree, enrollment in a hospital or college or university program of inhalation therapy training or a 1- or 2-year approved curriculum is recommended. The accrediting body is the Joint Review Committee for Inhalation Therapy Training, sponsored by the American Medical Association and the American Association for Inhalation Therapy.

To become registered by the American Registry of Inhalation Therapists, the applicant must meet the prerequisites of training and experience and, in addition, pass oral and written examinations.

To become certified by the Technician Certification Board of the AAIT, similar requirements are in effect.

Desired Traits

Aptitudes: Verbal ability is necessary to comprehend meaning of medical prescriptions and to confer with the patient. Clerical ability is necessary to recognize pertinent details in patients' charts and to keep accurate records. Motor coordination and finger dexterity are necessary to set up equipment, manipulate controls, and to make minor repairs.

Interests: A preference for sciences, machines, and techniques is essential. So is a preference for working with people to benefit their health.

Temperament: The inhalation therapist should be able to communicate calmly with people who are under stress. He should also be extremely accurate, since this is essential in regulating medication and equipment precisely to prescription orders.

DOT Code: Inhalation Therapist 079.368-018

For further information, write to:
American Association for Inhalation
Therapists
3554 Ninth Street
Riverside, California 92501

Library Services in the Health Field

Library services are maintained in practically all hospitals; medical, dental, nursing, and pharmacy schools; research institutes; pharmaceutical houses; and most other health organizations. Approximately 3,800 librarians and about 5,200 supportive personnel worked in the health services in 1971, according to the American Medical Library Association. Broadly speaking, medical libraries serve three purposes: the needs of professional staff (medical, scientific, administrative, and so on), the needs of professional schools (nursing and other disciplines), and the needs of hospital patients.

Medical Librarian

Year after year a vast store of knowledge accumulates in the many branches of medicine, in medical research, and in scientific research related to medicine. This knowledge is recorded in journals and other periodicals, text books, monographs, and

A medical librarian reviews file materials to acquire information requested by a hospital staff member.

other publications.

These publications, coming from every part of the world, are collected in the medical library where they are made available for professional people needing them for various purposes. What is discussed in Bombay must be made available as quickly as possible to the health professionals and students in London and New York.

Doctors, nurses, dentists, pharmacists, therapists of various kinds, technicians, and health profession students may come to the library for texts or monographs on a subject of special interest. Or they may search the journals for background material or for research reports on the latest developments in their field.

The medical and scientific journals would also be used by research scientists or research students, since these are the main source of information on what has already been done, and what is currently being done in the field in which they are working.

The Medical Library

Ordering, classifying, indexing, and keeping files and loan records of the materials in the library is basic, but it is only the beginning of the job.

Readers and researchers frequently call upon the specialized skills of the librarian to track down information on a particular subject. The material may be in obscure documents or scattered in many places, requiring a bit of detective work to find it. If the document is in another language, the librarian may be called upon to obtain a translation. Frequently, the librarian is called upon to compile bibliographies or provide a comprehensive review or abstract on a particular subject.

Aside from serving in person, the librarian also responds to mail or phone inquiries. Wherever the question comes from, success in finding the answer depends largely on the librarian's skill. Librarians may have only very general knowledge of medicine, but must know how and where to locate every type of information or material on short notice.

Medical librarians work in such places as schools of medicine, nursing, dentistry, and pharmacy; hospitals; research institutes; pharmaceutical houses and similar industries; health departments; professional societies; and voluntary health agencies.

In a hospital, the service offered by the medical library will depend on many factors: whether the hospital conducts research and training, the categories of illness treated, and others. In some hospitals, there are separate libraries: the medical library, the nursing school library (if there is a nursing school there), and the patients' library. More and more, however, these are being grouped together under the direction of one chief librarian, with assistants in charge of the separate services.

In the school of nursing, the librarian is considered a member of the faculty. She is concerned with developing the school's curriculum, meeting the reference requests of graduate and student nurses, and providing both groups with recreational reading.

The librarian also plays an important role in the hospital rehabilitation service.

The librarian serving patients will provide book cart services, develop programs of interest for patients who are up and about, and visit new patients to learn about their reading interests.

Background and Training

To be happy and successful as a medical librarian, the prospective student needs to have a genuine respect for the printed word—for the publications that record the forward march of science. But the librarian deals with people as much as with books. Friendliness and the capacity to understand and share other people's interests are important. A sense of humor, a well-developed curiosity, and good imagination are great assets.

The bachelor of arts or bachelor of science degree is required for entrance to any of the 49 schools of librarianship in the United States accredited by the American Library Association.

A program taking 1 calendar year beyond the bachelor degree leads to a master of science or a master of arts degree in librarianship. Since admission requirements of the individual schools vary slightly, the candidate is advised to write to the school for specific information in this area. Many schools offer postgraduate programs which may lead to a doctor of philosophy or doctor of library science degree.

During the college years the student may concentrate in one of several areas.

Medicine and its allied disciplines are so wide-ranging that one could major in any of the following broad subject areas:

- Biological science: biology, zoology, embryology, anatomy, physiology.
- Behavioral and social science: psychology, sociology, economics, anthropology.
- Humanities: foreign language, history, literature.
- Physical sciences: chemistry, earth sciences, physics, mathematics.

Good reading knowledge of at least one foreign language is necessary and a fair degree of fluency in several is helpful.

Status and Standards

Certification is desirable but not compulsory. To fulfill the requirements for the Medical Library Association's certification one should complete an MLA accredited course in medical literature. Such courses are offered throughout the country and several are given during a 6-week summer session. A list of schools offering the course and of schools accredited by the ALA may be obtained from the Medical Library Association.

In addition to formal classroom training, internship programs are available in some of the larger medical libraries, and trainee programs are sponsored by organizations and agencies including the Veterans' Administration.

Opportunities for Employment

Medical libraries range in size from the National Library of Medicine with one and a quarter million volumes (making it the largest medical library in the world) to specialized libraries with 5,000 volumes. However, most are in the 20,000 to 25,000 volume ranges. Medical librarians are much needed in many kinds of institutions, and opportunities are good for both men and women.

In academic libraries, the librarian may be accorded faculty status and may teach courses in the use of the library and its resources.

Related Occupations

To cope with an unending flood of medical information, the larger medical libraries employ many people who are not necessarily librarians. Some of these people are concerned with computers, microreproduction equipment, photoduplicating devices, teledata processing, and various audiovisual machines. Others may be translators, abstractors and indexers, who, though not necessarily librarians, have a knowledge of medicine and science.

DOT Code: Medical Librarian 100.168-030

For further information, write to:
Medical Library Association, Inc.
919 North Michigan Avenue
Chicago, Illinois 60611

Medical Assistant

The medical assistant is the doctor's "factotum," his "do everything." She combines in one person the role of secretary, receptionist, administrative aide, clinical aide, and countless other functions. She is the link between the physician and his patients, his professional associates, and his suppliers of equipment and medication.

Most medical assistants work in the office of physicians in private practice. Some work in group practice offices or medical clinics. The remainder are employed in larger institutions, such as hospitals and research laboratories.

Duties

It is the medical assistant's job to assist the doctor in managing his office efficiently and to perform a variety of clinical and administrative duties, freeing the doctor to concentrate on diagnosis and treatment of patients.

In a typical day a medical assistant may perform all of the following duties:

- Assist the doctor in giving some examinations.
- Receive patients.
- Answer the telephone and schedule appointments.
- Obtain medical histories from patients.
- Arrange hospital admissions.
- Greet representatives from various firms selling medical supplies.
- Assist in emergency situations.
- Reassure and comfort nervous and ailing patients.
- Order medical supplies.
- Type medical reports and fill out insurance forms.

Personal Qualifications

Important personal qualities are adaptability, kindness, physical stamina, a positive attitude, discretion, good judgment, neatness, and accuracy. Above all, the medical assistant must be sincerely devoted to helping people. She must maintain a friendly, cheerful manner that is at the same time sympathetic and courteous.

The medical assistant must be constantly alert to the fact that her attitude and manner reflect on her employer and enter into the impression that others have of him.

Education and Training

Students interested in a medical assisting career can begin preparing for this occupation before leaving high school. There are a number of high school courses which will prove valuable. Most important are: basic secretarial, typing, English, mathematics, and courses emphasizing health sciences.

Ideally, the high school graduate should enroll in a 2-year associate degree program offered by a community or junior college. The 2-year program has been established to give the student a broad foundation in basic medical assisting skills, including a period of practical experience in a doctor's office. The 2-year program also enables a medical assisting student to apply for certification upon graduation, provided the college she is attending has been approved by the American Medical Association in cooperation with the American Association of Medical Assistants (AAMA).

Many schools also offer 1-year courses which confer a certificate. Exploring other educational avenues may be necessary when it is not possible to enroll in a college offering a 2-year or 1-year course. Vocational and technical schools and reputable commercial institutions offer a variety of short-term courses which can be beneficial.

Some training is available through on-the-job programs sponsored by the Manpower Development and Training Act. Further information about MDTA opportunities is available from State employment service offices.

If it is necessary to go to work without receiving special training, some medical assistants will be able to find a physician who will train personnel on the job.

Continuing Education

Once the medical assistant is employed, she may enroll in the local chapter of the American Association of Medical Assistants. She will learn a great deal from fellow members and the speakers at monthly meetings. Many groups also sponsor educational seminars and chapter study courses.

After she has acquired the necessary experience, as determined by the AAMA Certifying Board, she will be eligible to apply for the certification examination. With the guidance of reference texts and a detailed study outline, she can prepare herself to take the test and become a certified medical assistant.

Prospects

The present and projected job opportunities for medical assistants are excellent, particularly for those who are graduates of a 2-year program. Many new openings are becoming available because of the general expansion of the health care field. Also, thousands of medical assistants are required every year to replace those who retire or leave the profession to marry or care for their families.

Mature women seeking reentry into employ-

ment are finding the work of medical assisting rewarding on either a full-time or part-time basis. The compassion, understanding, and maturity gained through raising a family and running a household is a decided asset to the medical office.

The medical assistant usually works a 40-hour week, but these hours are often somewhat irregular. She may work evenings and Saturdays with compensatory time off. Salaries vary according to the community and to the individual's qualifications. Junior college graduates usually receive higher salaries than individuals without academic qualifications.

DOT Code: Medical Assistant 079.368–022

For further information, write to:
American Association of Medical Assistants
One East Wacker Drive, Suite 1510
Chicago, Illinois 60601

Medical Profession

Medicine is one of the most ancient and dedicated of callings. Men have devoted themselves to "the healing art" since history began—and this time-honored name is still perhaps the best way to describe the practice of medicine.

We turn to the physician in time of illness or accident. In times of crisis, we literally put our lives in his hands. We turn to him, too, when there is no crisis—to help prevent illness and make the most of our own health. With all these demands upon his time, the physician is seldom, if ever, entirely "off duty." All over the country—and all over the world—physicians are on call day and night, year in and year out.

The supply of physicians has a hard time keeping up with the demand. Young men and women who have the background necessary for the study of medicine can be sure that their training will be worth all the time and effort it takes, and that their services will always be needed.

Progress in the health sciences and in people's understanding of their own health needs has put added pressure into this demand. At no time in history has medical research made so many dramatic advances as in the last few decades. These advances have changed the practice of medicine enormously—and new discoveries are constantly being made. Today's physician no longer has to fight sickness alone. He can enlist the aid of other health professionals with special skills, and he is backed by an army of research specialists who give him new drugs, better equipment, and improved techniques. He can take his patients to hospitals, where he can be sure of highly skilled nursing care and can command all kinds of specialized facilities. This teamwork makes modern medicine possible.

Yet no calling requires more in the way of personal responsibility, individual judgment, and the capacity to make decisions, and none offers more opportunity for exercising independence of thought and action.

Doctor of Medicine

Idealism, hero worship, the family tradition are all good reasons for considering a medical career, but unless they are balanced by realism, they may not provide a reliable and accurate picture of the doctor's life. There is indeed much glamour and drama in the physician's career, but his accomplishments are more accurately measured by his hard, patient work; his infinite attention to what may seem prosaic detail; and his willingness to undertake the unpleasant tasks that are part of his profession.

Personal Qualifications

Not everyone is cut out to be a physician. It is fair to say that no profession requires more exacting combination of strengths—intellectual, physical, and emotional.

Anyone who is looking toward a medical career must have a first-rate capacity for thinking and learning. Being a good student is important because medical training is long and the courses are difficult —and because being a good physician means adding to your learning constantly throughout your professional life.

The candidate for medical school needs to do well in science. He'll need plenty of intellectual curiosity, initiative, judgment, and the perseverance that will carry him through years of rigorous training.

Health is important, too. As a medical student, he will need enough physical stamina to take on 5 or more years of intensive study and clinical work after college. Whether he becomes a general practitioner, pediatrician, ophthalmologist, or other medical specialist, he will, during his early years, be on call 24 hours a day.

Finally, the would-be physician should be sure he has the emotional stability that the practice of medicine demands. A good physician not only likes people and genuinely wants to serve them, but he is also prepared to express this concern in the often difficult relations and decisions. It takes a special kind of attitude to deal with the human tragedies which are a part of every practicing physician's experience throughout his professional life. Human understanding and warmth are essential for the practice of medicine, but these must be tempered by objective judgment and reason.

Women as Physicians

Since 1849, when the first woman physician began to practice in this country, a substantial number of women have made careers for themselves in medicine. Nevertheless, the proportion of women in medical schools has been small and has increased only a little in the past 50 years. There are not as many female applicants as there are male. Old-fashioned and unfounded prejudice against "women doctors" is well on the way to disappearing. But the woman physician may still encounter reluctance to call on her in situations that involve irregular hours, heavy physical demands, or unusual strain.

However, girls interested in pursuing this career should not let these obstacles stand in their way. It should be encouraging to know that a higher percentage of female applicants are accepted for medical school than of male applicants.

Preprofessional Education

Medical training takes at least 8 years after graduation from high school—and may require from 10 to 15 years for those who want to specialize. Basic education is the same for all physicians, regardless of later specialization.

The first step toward a medical education is taken in high school, with courses that prepare the student for college entrance. The school he chooses should be an accredited college or university with high academic standards.

When he reaches college, he should talk to his faculty adviser about courses. (English, physics, biology, inorganic chemistry, and organic chemistry are required.) He should begin to look into medical schools to which he may want to apply and he should also write to several to find out about special entrance requirements.

At present, approved medical schools require a minimum of 3 years of college work for entrance. A substantial number require a minimum of 4 years or a bachelor's degree. Most authorities on medical education recommend taking the full 4 years of college and a degree. Admission to medical school is competitive, and a college graduate stands a much better chance of being accepted.

Good grades are important to the premedical student. Only 5½ percent of the 1969 medical school freshmen had grade averages as low as "C" in their premedical college work. If a premedical student finds college science difficult or can't place himself in the upper half of his class, he might be well-advised to reconsider his objectives. For the same reason, every premedical student should take the aptitude test given under the sponsorship of the Asso-

A physician discusses the results of an examination with the mother of a young patient.

ciation of American Medical Colleges. This test is taken a year before planned entrance into medical school. It helps determine the student's capacity for the study of medicine. Scores made on this test are used by many medical schools in screening applicants. The test is given twice a year; information about it may be obtained from The Psychological Corporation, 304 East 45th Street, New York, New York 10017.

At least 9 months to a year before he finishes his preprofessional training, the student should complete his medical school applications. He should apply to three to five schools. Most State medical schools show a decided preference for residents of their own States. A majority of American medical schools are now participating in the Central Application Service conducted by the Association of American Medical Colleges. The student submits just one application to the A.A.M.C. This organization will then forward copies to any medical schools the student designates.

Professional Education

The standard medical school course in the United States and Canada takes 4 years. However, some medical schools make it possible for the student to complete his studies in 3 years by staying in school during the summer vacations. Every medical school in the country meets the high standards set by the American Medical Association and the Association of American Medical Colleges, and has been officially approved by both of these professional organizations.

An alternate course is to take the first 2 years of medical school work in an approved school of basic medical sciences and the last two in a regular medical school. In 1969 there were 95 fully approved medical schools in the United States awarding the M.D. degree and six approved 2-year schools of basic medical sciences. Canada had 15 medical schools. Students considering medical study abroad should first get in touch with the licensing board in the State where they plan to practice, and ask for the names of foreign schools acceptable to that State.

Practically all medical students spend 1 or 2 years as interns in an approved hospital after they graduate from medical school.

A physician intending to specialize in a particular branch of medicine must have additional training as a resident physician. The trend in medical education seems to be away from the general internship (rotating through several specialties) and toward hospital training in the particular field of specialization.

Licensing

To practice, a physician must be licensed by a State board of medical examiners. Candidates must pass a licensing examination. In most States, the physician is permitted to apply for licensure immediately upon receipt of his medical degree; many States, however, require at least 1 year of internship. The majority of States will license without written examination a physician who holds a license from another State; some States limit this type of reciprocity. Three quarters of the States accept a certificate from the National Board of Medical Examiners as a basis for State licensing without further examination. To qualify for this certificate, the student must pass a three-part examination. The first part is given at the end of the second year in medical school; the second at the end of the fourth year; and the third after internship.

The medical student should obtain complete information about requirements for licensing, so he can take these into account in his plans for practice.

Financing Medical Education

For students who do not have the money to pay for a medical education, there are several alternatives. Most medical schools offer scholarships or loans to promising students. The Federal Government, too, has scholarship and loan programs and these are handled through the medical school. In addition, several States have their own scholarship and loan programs. Numerous banks have also worked out long-term loans for college and medical school students.

A medical record administrator reviews the file of a recently discharged patient, while a medical record technician reviews the card file for information on another case.

Students considering the possibility of working their way through medical school should know this is a difficult thing to do. Medical school work is very demanding, and there are not many free hours left for other things. It is the rare student who can handle his school work and after-school studying satisfactorily and still have enough time and energy left for even a few hours of employment. Medical schools strongly discourage employment of any kind, especially during the first year.

Some students consider taking a year off after college to work and earn some money for medical school. This, too, is discouraged; medical school is so long and intensive that it is best to plunge into it immediately on graduation from college. A break during the 4 years at medical school is even less desirable.

A few students, of course, do work their way through medical school, in spite of all the hardship.

General Practice

So many advances have been made in the treatment of the many different diseases and disabilities that it is not possible for one person to practice with full expertise in all branches of medicine. That is why there is so much specialization.

It is wise for a student to decide, while still in medical school, whether he wants to make his career as a general practitioner or as a specialist.

Today more than half of all physicians in private practice either limit themselves to work in one specialty or else devote a considerable part of their time to a specialty. Family practice itself has become a specialty. Today's family practitioner serves as the physician of first contact with the patient, evaluates the patient's total health needs, provides personal medical care, and accepts responsibility for the patient's total health care, including the involvement of consultants when needed.

To qualify as a specialist, the physician must spend additional years in study and training for his chosen branch of medicine. Many physicians begin their specialty training right after internship. They become residents in a hospital for several years and concentrate on a chosen aspect of medicine.

Residencies in the following branches of medicine are approved by the American Medical Association's Council on Medical Education:

1. Anesthesiology
2. Colon and Rectal Surgery
3. Dermatology
4. Family Practice
5. General Practice
6. General Surgery
7. Internal Medicine
8. Neurological Surgery
9. Neurology
10. Obstetrics and Gynecology
11. Ophthalmology
12. Orthopedic Surgery
13. Otolaryngology
14. Pathology
15. Pediatrics
16. Physical Medicine and Rehabilitation
17. Plastic Surgery
18. Preventive Medicine:
    - General Preventive Medicine
    - Aerospace Medicine
    - Occupational Medicine
    - Public Health
19. Psychiatry and Neurology:
    - Child Psychiatry
20. Radiology:
    - Diagnostic Radiology
    - Therapeutic Radiology
21. Thoracic Surgery
22. Urology

It can be seen from this list that some of the specialties have recognized subspecialties, and the physician may concentrate his practice as much as he chooses. For example, an internist's specialty field is internal medicine, but within this specialty he may further pinpoint his practice on allergy, arthritis, heart and circulatory disease, lung disease, or some similar area. Or he may specialize in pediatrics (child health) or geriatrics (health and medical needs of older people).

For formal recognition as a specialist, a physician seeks certification from the official accrediting body for his particular specialty. These are the American boards representing recognized fields of specialization. In general, requirements for specialty certification call for 2 to 4 years of advanced hospital training, followed by 2 or more years of practice in the specialty. After meeting requirements for certification and passing examinations set by the board, the physician becomes a recognized specialist—a diplomate—in his field.

Where Physicians Practice

Most physicians are in private practice, working either independently or with one or more professional colleagues. But there are also many other kinds of opportunities, both for general practitioners and for specialists.

Public health, for example, is itself a recognized specialty—with certification from the American Board of Preventive Medicine. (See the statements on the local health department in the section on Hospital and Health Services Administration. In addition to his medical degree and his medical training as a general practitioner or a specialist, the career public health physician usually has a graduate degree in public health. Maternal and child health, the control of both communicable disease and chronic disease, environmental health, the public health aspects of mental health are just some of the opportunities in public health. Most public health physicians are in government health departments—local, State, or Federal. But some are on the staffs of voluntary health agencies.

Physicians are also becoming increasingly involved in research. For information about this area see the section on Basic Sciences in the Health Field.

In addition to the continuing and heavy demand for physicians to staff hospitals, health departments, medical schools, and research institutions, there are innumerable opportunities in school systems, in business and industry, and in other institutional positions.

The Rewards

The physician can expect to make at least a comfortable living. On the whole, the medical profession is among the highest in earning potential. The physician also enjoys great prestige and is constantly called upon to serve in important professional and community activities. But above all is the satisfaction that comes from being able to relieve suffering and to save lives.

There are disadvantages: the long and irregular hours, the constant and relentless demand on the doctor's services; and the need to give up scant leisure hours to medical reading, studying, and postgraduate training courses (a "must" if he is to keep current with the latest development).

All in all, however, there are very few physicians who do not feel that theirs is among the most rewarding and fulfilling of all professions.

DOT Code:

Anesthesiologist	070.108-010	Otolaryngologist	070.108-054
Cardiologist	070.108-014	Pathologist	070.081-010
Dermatologist	070.108-018	Pediatrician	070.108-058
Flight Surgeon	070.108-022	Physiatrist	070.108-062
General Practitioner	070.108-026	Physician, Head	070.108-066
Gynecologist	070.108-030	Physician, Occupational	070.108-070
Intern	070.108-034	Police Surgeon	070.108-074
Medical Officer	070.108-038	Proctologist	070.108-078
Neurologist	070.108-042	Psychiatrist	070.108-082
Obstetrician	070.108-046	Radiologist	070.108-080
Ophthalmologist	070.108-050	Surgeon	070.101-014
Orthopedic Surgeon	070.101-010	Urologist	070.108-090

For further information, write to:
American Medical Association
535 North Dearborn Street
Chicago, Illinois 60610

National Medical Association
1717 Massachusetts Avenue, N.W.
Washington, D.C. 20036

American Medical Women's
Association, Inc.
1740 Broadway
New York, N.Y. 10019

Association of American Medical Colleges
One Dupont Circle
Washington, D.C. 20036

Medical Records

A medical record is a permanent document giving a complete and unbroken account of a person's illness or injury and of all that is done for him medically while he is in the hospital or other health facility.

A medical record would include the following kinds of information: when and how the condition first came to medical attention; how the diagnosis was arrived at; how the condition was treated; what operation was performed and the outcome; the schedule of treatment; the tests that were made; the course of the patient's condition during the hospital stay.

These observations and findings originate from many sources—the physician, nurse, laboratory personnel, and other professional members of the staff—through a network of written communications, records, and reports from all the hospital departments.

The medical record is indispensable to diagnosis and treatment. It is also invaluable as a source of information for the verification of legal claims, statistical charting of health trends, and medical-scientific research.

Medical Record Administrator

It is the responsibility of the medical record administrator to see to it that for each patient in the hospital a complete, continuous, and accurate record is kept from the time of his admission to the time of discharge.

A great deal of material must be gathered and checked: patient's medical history, results of the physical examination, diagnosis, laboratory findings, medication, temperature readings, progress, notes, and others.

From this record all hospital professionals involved in the care of the patient can tell at a glance what treatment has been carried out and what treatment is being planned.

When a patient is discharged from a hospital, his medical record is sent to the hospital's medical record department. There it is checked for accuracy and put in files for future use in the event the patient should return.

To maintain the accuracy of the medical record, the medical record administrator makes sure that uniform medical terminology is used by the various members of the staff who make entries in it.

The medical record administrator is responsible not only for the content of each record but also for maintenance of all of the records in an efficient medical records library. She follows a recognized classification system in coding diseases, operations, and other factors. She indexes information from the records, sets up catalogs, and controls the traffic in case records.

The medical record administrator also prepares medical and statistical reports upon request. Most hospital administrators request daily, weekly, and monthly reports from the medical record department. These reports are used in directing operations and formulating policy.

Qualifications and Education

Important qualities in a medical record administrator are orderliness, accuracy, and precision. Since the duties involve working with very busy physicians and occasionally with worried patients and their families, poise and patience are essential traits. The obligation to keep medical records confidential requires a strong sense of responsibility and discretion.

A minimum of 4 years of study following high school is required to become a professional registered medical administrator. There are alternate programs of study. One is a 4-year program in a college or university giving a bachelor degree in medical record administration or medical record science. The other is a 12-month course in a hospital certificate school following 4 years of college study with specific background in the biological sciences. On completion of either of these programs the graduate is eligible to take the national registration examination for registered record administrator, signifying professional status in the medical record field.

Prospects and Standards

The demand for competent medical record administrators far outstrips the supply. Hospitals throughout the country offer positions with long-term security. In large institutions, the head of the medical record department may have a staff which includes RRA's, medical record technicians, medical record clerks, medical transcriptionists, and medical secretaries.

At present only 4,000 registered medical record administrators are employed in this field. About 10,000 facilities need their services. Job opportunities exist in hospitals, clinics, neighborhood health centers, medical research organizations, health departments, nursing homes, and government agencies. There are also teaching positions in accredited schools for medical record technicians.

Medical Record Technician

This is a comparatively new job classification. The medical record technician assists the medical record librarian in the technical work of maintaining medical records, reports, disease indexes, and statistics required in hospitals and clinics.

The student interested in becoming a medical record technician may acquire the necessary training in one of two ways. Two years of junior college study leading to an associate degree in science; or 9 to 12 months of special education in an accredited hospital school or junior college, following completion of high school. The former is becoming the accepted training program.

The student medical record technician receives instruction on medical technology, anatomy and physiology, medical report transcription, hospital statistics, medical record analysis, and other medical record practices used in medical care institutions.

Educational programs for medical record technicians are accredited by the Council on Medical Education of the American Medical Association in collaboration with the American Medical Record Association. There are 30 accredited medical record technician schools, and a correspondence course in medical record procedures is offered by the AMRA.

Only graduates of accredited schools for medical record technicians and those who complete the AMRA Correspondence Course are qualified to take the National Accreditation Examination for the designation ART—accredited record technician.

Trained medical record technicians are in great demand in hospitals, clinics, and other medical care institutions in the United States. Opportunities for advancement through continued education are excellent in this field.

Salaries for medical record technicians range from $6,000 to $14,000 a year, depending on experience and locale. Technicians with exceptional ability and interest often continue their college education and complete medical record librarian programs.

DOT Code:	Medical Record Administrator	100.388–018
	Medical Record Technician	249.388–033

For further information, write to:
American Medical Record Association
875 North Michigan Avenue, Suite 1850
John Hancock Center
Chicago, Illinois 60611

Medical Technology and Related Occupations

The physician has available to him a number of tests and devices with which he can make a general appraisal of a patient's condition—taking the patient's pulse, temperature, and blood pressure; listening to the heart and lungs with a stethoscope; looking into the nasal passages with a nasoscope or into the eyes with an ophthalmoscope.

With these he can detect gross changes in the functioning of the various organs and, in most common illnesses, make a diagnosis.

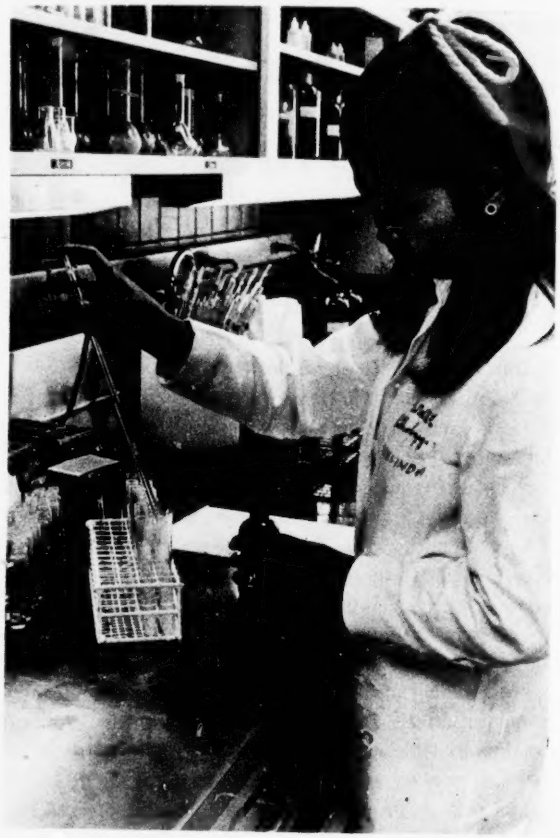
But there are many illnesses where the symptoms are not so easily detectable. These are illnesses in which there are changes in the body fluids and tissues not discernible by the naked eye or ear. They include chemical changes in the blood, urine, lymph; increase or decrease in the blood count for the various types of white or red blood cells; microscopic changes in the structure of the cells of a diseased tissue or organ; and the presence of parasites, viruses, or bacteria in the blood or diseased tissue.

To detect these the physician must submit specimens of blood, urine, or tissue to a variety of highly technical tests in the laboratory. Combining laboratory findings with other observations, he is then able to make an exact and accurate diagnosis.

Laboratory examination of body fluids and tissues serve other purposes as well. Blood tests must be made to determine blood types in the event of a blood transfusion. There are certain blood types which, if mixed in conception, will produce abnormal offsprings. These can be detected by laboratory tests. Some individuals react with violent allergic reaction to different kinds of medications, and laboratory tests are used to detect this type of sensitivity.

Aside from tests such as these, the physician

A medical technologist places a solvent into a series of test tubes, readying them for use in the treatment of body tissue prior to examination.



also relies on electronic devices which detect abnormal functioning in bodily organs—the electrocardiogram for heart disorders and the electroencephalograph for neurological disorders.

Although the physician must have the results of these tests for evaluation and diagnosis, he does not perform them himself. They are performed by medical technologists and technicians in medical laboratories, under the supervision of medical specialists known as pathologists.

Medical Technologist

Following are illustrations of the kinds of tests the medical technologist would be expected to perform:

- Matching blood samples of donor and recipient in blood transfusions.
- Growing "cultures" of bacteria found in patient's blood, sputum, feces, or discharge from a sore or wound, and identifying the bacteria.
- Searching for and identifying parasites (e.g., tapeworms, pinworms) living in the body.
- Testing for the presence or absence of various chemicals in the blood and other body fluids.
- Testing for antibodies and other disease-fighting elements in the blood.
- Analyzing urine for evidence of illnesses such as diabetes, nephritis, infection of the bladder, cancer of the bladder, etc.
- Doing blood tests to detect illnesses of the blood, such as hemophilia, anemia, leukemia, and mononucleosis.

Some medical technologists perform all these tasks while others specialize in only one of these specific fields. Technologists are also trained to operate special apparatus and a wide array of precision instruments: electronic counters, automatic analyzers, centrifuges, microscopes, autoclaves, spectrophotometers, colorimeters, microtomes, and computers.

Qualifications and Education

Anyone planning a career in medical technology should have an aptitude in science, should like to work in a laboratory, and have the ability to do careful, reliable work even under pressure.

Medical technologists should be skilled at using their hands, since they work with small instruments and delicate equipment. Other necessary assets are good health, normal vision, and an ability to distinguish fine shades of color. Some materials handled by the technologist might seem unpleasant to those who lack scientific interest and education, but medical laboratory technologists cannot afford to be unduly squeamish.

The educational requirements for certified medical technologist include graduation from high school (or its equivalent), followed by 3 years in college plus 1 year of clinical education in a school of medical technology approved by the Council on Medical Education and Hospitals of the American Medical Association.

The pre-technology college program includes a minimum of 16 semester hours each in approved chemistry and biological science courses. Also, a minimum of one semester of college level mathematics is required.

At the end of 3 years (or 90 semester hours), students are ready to begin the clinical education phase in one of the nearly 800 approved schools of medical technology located primarily in hospitals. In some universities with a School of Allied Health Professions or Allied Health Sciences, the entire 4-year curriculum is integrated to provide clinical laboratory experience and the basic science courses simultaneously. The student should consult the school of his choice while still in high school. Most of these accept a limited number of students (10 or less) at a time, so application for admission should be made at the end of the fifth semester of college.

Clinical education in most of these schools lasts 12 months. In a few, the course is longer.

Most of the hospital schools are affiliated with colleges or universities that accept the fourth year of clinical education as fulfilling the requirements for the baccalaureate degree. A few of the hospital schools require a college degree before admission.

About 50 percent of the university-based schools charge fees, ranging from token to standard. Others charge no fees at all. Some schools will provide stipends and/or maintenance and scholarships.

Status and Standards

After completing college work and the clinical education in an approved school of medical technology, the graduate can receive certification from the

Registry of Medical Technologists of the American Society of Clinical Pathologists by passing an examination given by the registry. Individuals who pass the exam are then allowed to use the initials MT(ASCP) after their name.

The American Medical Technologists registry grants certification to those who have completed 90 semester hours in an accredited college with specific course requirements, have completed 1 year of approved laboratory experience, and have passed the registry's medical technologist examination. American Medical Technologists have developed a career ladder for medical laboratory technicians to enable those qualified to apply for medical technologist certification with the addition of 3 years of approved laboratory experience.

Opportunities and Prospects

A majority of today's medical technologists work in hospital laboratories. In a small hospital, the technologist is more likely to work in all areas of the laboratory. In larger hospitals, the newcomer may work for a while in each of the specialized areas, to gain experience, then later settle into just one of them.

Skilled technologists are also in demand by physicians who maintain their own laboratories; public health laboratories, where the chief work is in communicable disease; independent laboratories that provide medical investigation to private physicians; medical research institutes; colleges and universities; companies that manufacture drugs, serums, vaccines, antibiotics, and diagnostic reagents; and the Armed Services.

A career as a medical technologist is especially suited to women who want to work part time after marriage. Many return to the laboratory when their children are grown; others work beyond the usual retirement age. Reentry is generally very easy, and there is good potential here for economic security.

There is also a special place here for handicapped persons whose vision and manual dexterity is unimpaired; these are known to make excellent medical technologists.

Promotion to administrative and supervisory positions is gained through experience and self-improvement. Unlimited opportunities exist for teachers who, with experience, move into positions which allow them to direct and coordinate educational programs and curriculum. Opportunities for advancement also exist in medical research in medicine. The education in medical technology also provides an excellent background for graduate work leading to advanced degrees in laboratory sciences, teaching, and administration.

Medical Laboratory Technician

Until recently, most of the laboratory testing was done by the medical technologist. However, the technologists have, for the most part, moved on to supervising and teaching. They still do some of the most difficult and complicated testing; otherwise, all but the routine testing is now done by medical laboratory technicians, under the supervision of the medical technologist. (The routine testing is done by certified laboratory assistants, discussed next.)

Preparation for medical laboratory technician requires a high school education followed by an associate degree from an accredited junior or community college and by clinical experience in an approved laboratory. Students with this experience may receive certification as a medical laboratory technician by the Registry of Medical Technologists (MLT-ASCP).

They may also receive certification by the American Medical Technologists registry. This registry will also give certification as a medical laboratory technician to high school graduates who have completed a combined 2-year work-school experience, with the school program approved by the Accrediting Bureau of Medical Laboratory Schools. The American Technologists registry will also give certification as medical laboratory technician to students who have completed a 50-week Armed Forces course in medical laboratory techniques together with approved laboratory experience. All applicants for AMT registry certification must pass a registry examination.

Certified Laboratory Assistant

The laboratory assistant works under the direct supervision of the medical technologist in performing routine laboratory procedures in bacteriology, blood banking, chemistry, hematology, parasitology, serology, and urinalysis.

To qualify for certification as a certified laboratory assistant, one must graduate from high school and complete a 12-month training program in a certified laboratory assistant school approved by the American Medical Association.

Currently, hospital laboratory schools are being accredited to provide qualified high school graduates with 1 year of practical and technical training in routine laboratory work. Graduates of these schools who pass an examination given under the Board of Registry's direction may place the letters CLA(ASCP) after their names, indicating their certification as qualified laboratory assistants.

The laboratory assistant may receive, also, limited certification as laboratory technician (CT Limited Certification) from American Medical Technologists. Applicants must be graduates of an accredited high school or equivalent, and have completed not less than 24 months of on-the-job training in an approved laboratory. They must also pass a certification examination.

DOT Code:	Medical Technologist	078.281–018
	Medical Technologist, Chief	078.168–010
	Medical Technologist, Teaching Supervisor	078.128–010
	Medical Laboratory Technician	078.281–026
	Certified Laboratory Assistant	078.381–010

For further information, write to:

American Medical Technologists
710 Higgins Road
Park Ridge, Illinois 60068

American Society of Clinical Pathologists
2100 West Harrison Street
Chicago, Illinois 60612

American Society of Medical Technologists
Suite 1600, Hermann Professional Building
Houston, Texas 77025

National Committee for Careers in the
Medical Laboratory
9650 Rockville Pike
Rockville, Maryland 20014

Cytotechnologist

The cytotechnologist is trained in special laboratory techniques for detecting body cell changes. Working under a pathologist, the cytotechnologist screens slides of cell samplings, magnified many times, under the microscope, tracing clues to disease in the patterns of cytoplasm and nuclei stained with special dyes to make them stand out brightly. Abnormalities can be warning signs of cancer.

Educational preparation for cytotechnologist requires at least 2 years of college work including 12 semester hours in biology, followed by a minimum of 6 months in one of over 100 American Medical Association's approved schools of cytotechnology and 6 months' experience under supervision in an acceptable cytology laboratory. The student is then eligible to take the certifying examination given by the Registry of Medical Technologists, and upon passing may place CT(ASCP) after his name.

DOT Code:	Cytotechnologist	078.281–014

For further information, write to:

American Medical Association
535 North Dearborn Street
Chicago, Illinois 60611

American Medical Technologists
710 Higgins Road
Park Ridge, Illinois 60068

American Society of Clinical Pathologists
2100 West Harrison Street
Chicago, Illinois 60612

Histologic Technician

The histologic technician cuts and stains tissues which have been removed from the body, so that they can be examined microscopically by the pathol-

A blood bank technologist examines a blood sample with the aid of a powerful microscope.

ogist for any signs of malignant or questionable cells.

The Registry of Medical Technologists gives limited certification, following examination, for histologic technique. This requires a high school diploma plus a year of supervised training in histologic technique.

DOT Code: Histologic Technician 078.381-018

For further information, write to:
American Medical Technologists
710 Higgins Road
Park Ridge, Illinois 60068

American Society of Clinical Pathologists
2100 West Harrison Street
Chicago, Illinois 60612

American Society of Medical Technologists
Suite 1600, Hermann Professional Building
Houston, Texas 77025

Blood Bank Technologist

The blood bank technologist collects blood from donors; then classifies, processes, and stores it so it can be instantly available, either as whole blood or as plasma. This work is done in hospitals, clinics, and special blood bank centers.

Blood bank technologists are certified medical technologists who have had an additional year of approved training in a blood bank school approved by the American Association of Blood Banks. Upon passing an examination, they may be certified by the Registry of Medical Technologists (ASCP) as MT(ASCP)BB.

DOT Code: Blood Bank Technologist 078.281-018

For further information, write to:
American Association of Blood Banks
30 North Michigan Avenue, Suite 1322
Chicago, Illinois 60602

Electrocardiograph Technician

Hospitals maintain highly specialized technical equipment used in the diagnosis of certain illnesses. One such piece of equipment is the electrocardiograph (called the ECG or EKG) machine which records heart actions. The ECG machine is used to help diagnose heart disease and record the progress of patients with heart conditions.

The person who operates the ECG machine is called an electrocardiograph technician. He may work in a hospital laboratory or at the patient's bedside, depending on whether the patient may be moved. After making sure that the patient is comfortable, the ECG technician attaches electrodes to the patient's chest, arms, and legs. He moves the chest electrode to successive positions across the patient's chest, thereby obtaining several different tracings of the heart action on the ECG machine. After the test is made, the machine tracings are interpreted by a physician especially qualified in cardiology.

The ECG technician must be thoroughly familiar with the operation of the equipment and be able to know whether the machine is functioning properly.

The ECG technician should be a high school graduate with courses in the physical sciences; some college work is desirable. Special training in a hospital usually includes a 3- to 6-month on-the-job program under the supervision of an experienced technician or a cardiologist.

Electroencephalograph Technologist

Another technical position in the hospital is that of the electroencephalograph (or EEG) technologist, trained to operate an instrument which records brain waves. The EEG is used to assist in the diagnosis of various kinds of organic brain disease, such as epilepsy, brain tumor, or stroke. When a physician requests an EEG examination, the patient is usually taken to the EEG laboratory. However, modern EEG equipment is designed to be transportable, so that bedside recording is done when the patient's condition warrants it.

The technologist is responsible for carrying out the actual recording of a patient's EEG activity. Small electrodes are applied to the patient's scalp in standard locations. These are connected to the recording instrument, and the technologist selects the combinations of electrodes and instrument controls which will provide the most meaningful interpretation. These tracings are interpreted by a physician or Ph.D. with special training in electroencephalography. Throughout the recording period, the technologist observes the patient and keeps a careful record of his behavior. The technologist must have a fundamental understanding of the equipment being used, as well as of the diseases which are encountered in day-to-day work. Recognition of normal brain activity, awake and asleep, and of abnormal EEG characteristics, is necessary so that the collection of significant information can be made in an orderly way. Considerable individual initiative is expected when the technologist is fully trained. Further education, such as college-level courses and certain technical classes, is highly recommended but not required.

Most training is, at present, "on the job" in type, combined with instruction in anatomy, physiology (with emphasis on the nervous system), basic instrumentation, diseases of the brain, care of patients, and practical EEG recording. Increasingly, training is looked upon as covering a 1-year period. This may be broken down into a basic period of 6 months, with a following 6-month period of supervised practice. To become a registered EEG technologist through examination by the American Board of Registration of EEG Technologists, such a 1-year period plus a further year of experience is required.

DOT Code:	Electrocardiograph Technician	078.368–018
	Electroencephalograph Technologist	078.368–022

For further information, write to:
American Hospital Association
840 North Lake Shore Drive
Chicago, Illinois 60611

American Society of EEG Technologists
Chairman, Training & Education Committee
Lila Snodgrass, R. EEG T.
Division of EEG & Neurophysiology
Department of Psychiatry
University of Iowa
Iowa City, Iowa 52240

Nuclear Medical Technologist and Technician

Nuclear medicine is concerned with the use of radioactive isotopes to diagnose disease. The isotope is injected or inserted in the blood stream, tissue, or organ, and then its progress is followed by a device known as a scanner.

There are three levels of personnel working in the field:

- Medical doctors who specialize in nuclear medicine.
- Nuclear medical technologists who are involved mainly in laboratory work, doing analysis of tests.
- Nuclear technicians who are involved with the more routine tasks in this field.

Opportunities for advancement in this field are reported to be good. The technologist and occasionally the technician can advance to chief technologist in a nuclear medical department or laboratory. In most cases, the requirements for advancement are extensive experience in the field plus administrative ability. Most new hospitals currently being built have independent departments of nuclear medicine, and many of the older hospitals are setting up such departments. Most veterans' hospitals with over 200 beds have departments of nuclear medicine.

Many departments of nuclear medicine encourage their technologists and technicians to do their own research in the area of nuclear medical technology.

Few schools at present offer specific courses in nuclear medical technology. Most people entering the field do so after being certified as medical technologists (MT) by the Registry of Medical Technologists of the American Society of Medical Technologists (ASMT), or registered as Radiologic Technicians (R.T.) by the American Registry of Radiologic Technologists. To receive such certification or registration, the applicant must have had a year or more of on the job training in either a laboratory or a hospital. It is also possible for medical technologists to have an additional year of training in nuclear medical technology to become certified as a nuclear medical technologist and to use the initials N.M.T. after their name.

Some hospitals have summer programs providing work experience in nuclear medical laboratories for college students. A high school student interested in this field should get as much background as possible in biology, chemistry, and physics. Volunteer experience will also be useful in a hospital. To be registered as a technician, the student would need at least 2 years of formal technical training beyond high school. Those planning a career as a fully qualified nuclear medical technologist would have to plan on 4 years of college with a major in science plus experience in the field. Many of the top positions in research, in this field, involving development of new instrumentation require graduate degrees on the master's or doctorate level.

DOT Code:	Nuclear Medical Technologist	078.381–014
	Nuclear Medical Technician	078.381–022

For further information, write to:

American Society of Clinical Pathologists
2100 West Harrison Street
Chicago, Illinois 60612

American Society of Medical Technologists
Suite 1600, Hermann Professional Building
Houston, Texas 77025

American Society of Radiologic
Technologists
645 North Michigan Avenue, Suite 620
Chicago, Illinois 60611

Society of Nuclear Medical Technologists
1201 Waukegan Road
Glenview, Illinois 60025

Nursing and Related Services

When people think of nursing they generally think of the registered nurse (R.N.), also referred to as the professional nurse. There are, however, many others who work with the professional nurse in caring for the sick and in teaching people to stay well. Among these are the practical nurse, nursing aide, orderly, and attendant. In all, there are now more than 1,700,000 engaged in professional nursing and the allied nursing occupations.

In many different settings, nursing care is now regarded as a team service, with the professional nurse as the head of the team, assisted by the other categories of nursing personnel. This permits the professional nurse to concentrate on the specialized duties which only she can perform.

In a hospital, the professional nurse will have overall responsibility for a patient's nursing needs within the framework of the physician's medical care. The practical nurse may bathe the patient, the nurse's aide may feed him and make his bed, while the professional nurse performs such tasks as changing surgical dressings, assisting with blood transfusions, giving medication, or instructing the patient and his family.

Public health nursing agencies are making greater use of licensed practical nurses and home health aides to help with the physical care and homemaking needs of the patient, leaving the professional nurse such tasks as giving injections, changing dressings, giving medication (under a doctor's supervision), instructing the family on health care, prevention, sanitation, and so on.

Professional Nurse

In hospital nursing, positions for professional nurses range from general duty nurse (the usual beginning job) to director of the nursing service, with the in-between positions of head nurse and supervisor, each with its assistants and associates. A nurse's education, experience, and ability will determine the extent to which she advances.

Public health nursing is concerned not only with the care of the sick but also with the prevention of illness. The public health staff nurse (the beginning position in this field) goes into homes, schools, clinics, and industries. Positions in public health nursing range from this beginning position through supervisor to director of the service, each with its assistants and associates. Each of these has its special educational and experience requirements.

Occupational health (industrial) nurses work with employees of business firms, industries, and other establishments, and are responsible for the health of the workers on the job—and often off the job too. These nurses are concerned with the first-aid treatment for injuries and minor illnesses, and with helping to promote safe and healthful working conditions. Occupational health nursing, like school nursing, is often considered a part of public health nursing.

Nurses also hold teaching positions at schools of professional nursing, schools of practical nursing, and college and university programs offering advanced preparation in nursing and related fields.

In private duty nursing, the nurse contracts independently to give bedside care to patients in the home or hospital. She is engaged at the request of the physician or the family.

There are additional opportunities for nurses in U.S. Government service at home and abroad. These will be found in the military nurse corps of the Army, Navy, and Air Force; Veterans' Administration hospitals; Agency for International Development; and Peace Corps. Home and foreign mission services, national and international organizations (American Red Cross and World Health Organization, for example) provide many interesting positions for nurses. Physicians' and dentists' offices, camps, magazines and publishing houses, and professional organizations are other places where nurses work.

Nursing also has its clinical specialties. For example:

- Pediatric nurses specialize in caring for children.
- Obstetric nurses care for mothers and new babies.
- Psychiatric and mental health nurses care for mentally ill.
- Rehabilitation nurses care for patients with chronic and disabling conditions.
- Medical-surgical nurses care for patients before, during, and after surgery, and in most types of illness.

Other nursing specialties include the care of patients with particular diseases, such as cardiovascular illnesses, cancer, and pulmonary ailments.

Positions in advanced fields of nursing are open to nurses that have experience and have taken additional courses of study beyond the basic preparation, usually at the master's or doctoral level.

The new graduate of a basic nursing program most likely will begin his or her nursing career in a hospital as a general duty nurse—or in a public health agency as a staff nurse, provided she or he has completed a baccalaureate program approved for public health nursing. With more experience and further education, the nurse will then work up to the higher positions, as in any other profession.

The demand for professional nurses will continue to be very large, and nurses will continue to be needed in all parts of the world and in all kinds of situations. Professional nursing is a lifetime career, with few geographical limitations.

Working Conditions

Most professional nurses work a 40-hour week, although they cannot always expect a conventional 9-to-5 day. Nursing services go on 24 hours a day; nurses expect to take their turn at evening and night duty.

Professional nurses can choose their preferred area of specialization. Many nurses enjoy the routine of hospital work with its opportunity for direct patient care, participation in research, and in teaching. Others prefer the freedom of activity in public

A public health nurse helps an elderly patient in her convalescence.

A pediatric nurse cares for an infant.

Professional nurses monitor the reading of a patient's electrocardiograph.

health nursing—working with patients and their families through the health department, the school system, the visiting nurse association, or other community agencies. The occupational health nurse works in a factory or office which may employ large numbers of workers. Working in a physician's office or in private day nursing appeals to those who like a more independent setting.

Personal Qualifications

Intelligence, common sense, integrity, a sense of responsibility, a considerable degree of self-discipline, tact, and humor—all of these are important. A healthy outlook on life, both in its dark moments and on the lighter side, and good physical health are essentials. (The applicant will be required to pass a physical examination before being accepted by a school of nursing.)

A nurse must like people well enough to put up with them when they are irritable and when caring for them may be difficult. She must like people well enough to take care of all kinds of people, of all ages, and in all stages of illness or injury. Finally, the nurse must like people well enough to work smoothly with other members of the health team—physicians, nurses, and other professional personnel, and auxiliary workers.

Students who cannot foresee giving themselves to nursing with sincerity and purpose, but who hope only for a glamorous well-paying job, should consider some other profession. Preparation for nursing is hard work, but most nurses agree that the ideals and satisfactions of the profession are worth it.

An applicant to a nursing program must be 17 or 18 years of age. The maximum age limit depends on the individual applicant and the school. Most schools admit men students as well as women. Opportunities for men in nursing are excellent.

Students who plan to enter nursing school should have good grades and good study habits. The work is not easy; a great deal has to be learned in a relatively short time. Most schools of professional nursing will accept only applicants who are from the top half of their high school graduating class; and some will accept only those from the top third.

All schools of professional nursing require at least high school graduation for admission, and a few require college work. In addition, most require the completion of certain high school subjects.

Planning should begin as early as possible—even in the first or second years of high school. The interested student should obtain, quite early, the catalogs of a number of schools in which she may be interested so she can make sure she meets the course requirements. Since most nursing schools receive more applications than they can accept, it is advisable to apply by the end of the junior year.

If a high school has a Future Nurses Club or similar health careers group, the interested student should join. These groups help members to explore various nursing programs and career opportunities. They participate in volunteer work and other community service projects that help the student decide about a career.

Nursing Education

Professional nursing schools fall into three general categories: junior or community college schools offering a 2-year associate degree program; hospital schools of nursing offering a 2½- to 3-year diploma program; and colleges offering a 4-year baccalaureate program. All three types require graduation from high school, various pre-entrance examinations, plus a physical examination. Their programs cover the nursing arts and sciences which form an essential background for nursing practice.

The associate degree program (2 years) will include general education courses, especially science, at the junior college level, in addition to nursing theory and practice. The diploma course (2½- to 3-years) may also involve general education subjects, including biological, physical and social sciences, and nursing theory and practice.

Graduates of either of these courses are fully prepared for bedside nursing in a hospital, nursing home, or private duty, but they are not prepared for supervisory or administrative positions in nursing. Some students who complete a 2-year or 3-year program may wish to go on to the 4-year college program. This they can do, but should not count on getting transfer credit for the full 2 or 3 years of education they have had. Colleges may grant credit for some of the courses, or they may provide credit on the basis of examinations provided by the college.

The 4-year baccalaureate program ("baccalaureate" and "bachelor's" are interchangeable terms) includes work in the arts, humanities, and sciences. The major is in nursing, including theory and practice. Graduates are prepared for general duty staff nursing, for beginning positions in public health agencies, for advancement to supervisory and administrative work in nursing, and for graduate study leading to a master's or doctor's degree.

A graduate degree, which would involve 1 to 5 years of study beyond the baccalaureate, is ordinarily required for advanced clinical practice, teaching, research, and other advanced positions.

Cost of Nursing Education

It is not possible to give any average figures for the cost of nursing education because there is considerable variation.

The 2-year junior or community college nursing programs would be the least expensive. Some of these are public-supported and tuition is free except for incidental expenses. In a hospital or nursing school offering a diploma program, costs are somewhat higher than at a community or junior college. Costs for a college degree nursing program are comparable to those for a regular college program.

Many nursing schools have scholarships and loan funds. Several States provide State funds for nursing education, and Federal loans are also available in many nationally accredited schools. Inquiries about loans and scholarships should be made of the high school vocational counselor and the school of nursing the student plans to enter. (For more specific information on costs of nursing schools and scholarships, contact the "for further information" reference at the end of this section.)

Status and Standards

All nursing schools preparing professional nurses today are State approved. This means their graduates are eligible to take State licensing examinations. Those passing the State licensing examination are permitted to practice in the State and to identify themselves as registered nurses, using the initials R.N. after their names.

In addition, the National League for Nursing maintains its own national accrediting program. Accredited programs must meet educational standards for faculty and curriculum above minimal standards set by State boards of nursing. Prospective students should try to select baccalaureate, diploma, or graduate programs accredited by NLN. It should be noted that new nursing programs are not eligible for NLN accreditation until the first class of students has completed or is near completion of its program.

Registered nurses may become members of the American Nurses' Association. Along with friends of nursing, practical nurses, allied professional people, and others interested in health care, they may join the National League for Nursing, which provides them with an opportunity to work together with other people in their communities for the improvement of nursing education and nursing service. Professional nursing students have their own organization, the National Student Nurses Association.

Licensed Practical Nurse

Licensed practical nursing is an expanding field, attracting men as well as women. A licensed practical nurse (L.P.N.) who has graduated from a State-approved school is trained and qualified to give bedside nursing care to patients and assist the professional nurse with patients who are more seriously ill. He or she has an important role in the care of the sick and in the prevention of illness, working under the direction of a physician or a professional nurse.

Opportunities

Because of the expanding professional responsibilities of registered nurses, the L.P.N. is providing a large share of bedside nursing care. L.P.N.'s are employed in hospitals, public health agencies and rehabilitation agencies, private homes, physicians' offices, clinics, nursing homes, and such special institutions as psychiatric hospital or children's hospitals. Many L.P.N.'s prefer to work in an area of nursing such as medical-surgical, intensive care, pediatric, and psychiatric. There is an increasing demand for men as licensed practical nurses, especially in the area of psychiatric and rehabilitation nursing.

A licensed practical nurse can look forward to a secure employment future, since the supply falls short of the demand.

The age limits for admission to a school of practical nursing are generally from 17 or 18 to 50, although those 50 and over are often accepted on an individual basis. In some States L.P.N.'s under 19 may be restricted to hospital work.

Training

State-approved practical nursing schools are operated by hospitals, community agencies, junior and senior colleges, and public vocational schools. Most approved schools offer a 12-month course, although some programs are longer.

Instruction and nursing practice include the care of medical, surgical, and obstetric patients, and special care required for infants, children, the elderly, and the chronically ill. It also includes some selected background information in the behavioral and biological sciences.

It is important to check the educational requirements of several schools before applying. Some require as little as 8 years of education. Most require a minimum of 2 years of high school. Many are now raising their minimum requirement to high school graduation or high school equivalency.

Total costs for a practical nursing course, in 1971, ranged from $50 to $1,280. If the course is offered by a public education system for high school students as a part of its vocational education program, there is usually no charge, but there may be minimum fees and incidental expenses. Tuition free courses are also sponsored under the Manpower Development and Training Act (MDTA), and some of these may provide a stipend. (For more details contact the local State employment service office.) Scholarships are available in some schools of practical nursing to cover the cost of the program.

Standards of Training and Licensure

All States have laws for the licensing of practical nurses as L.P.N.'s (or L.V.N., licensed vocational nurse in California and Texas). Most States require graduation from an approved school to qualify for the State board exam for licensure. It is therefore important that the student choose a State-approved school. Graduates from correspondence schools are not eligible to take the licensing examination.

In addition, schools may be accredited by the National League for Nursing (NLN) or by the National Association for Practical Nurse Education and Service (NAPNES). The standards set by these organizations for accreditation are generally higher than those required for State approval.

Training for licensure as a practical nurse includes an integrated curriculum of classroom study in nursing courses and supervised hospital practice work in the care of patients.

L.P.N.'s as well as students enrolled in practical nursing courses may become members of the National Federation of Licensed Practical Nurses and of the National Association for Practical Nurse Education and Service (NAPNES). Both work toward the professional development of L.P.N.'s, while acting as spokesmen for the group. They also work in cooperation with allied health career groups in improving health care services.

DOT Code:	Nurse, Head	075.128–018
	Nurse, Instructor	075.128–022
	Nurse, School	075.128–026
	Nurse, Staff, Public Health	075.128–030
	Nurse Supervisor	075.128–034
	Nurse Supervisor, Occupational Health Nursing	075.128–038
	Nurse Supervisor, Public Health Nursing	075.128–042
	Nurse, Anesthetist	075.378–010
	Nurse, General Duty	075.378–014
	Nurse, Office	075.378–018
	Nurse, Private Duty	075.378–022
	Nurse, Staff, Occupational Health Nursing	075.378–026
	Nurse, Licensed Practical	079.378–026

For further information, write to:

ANA-NLN Committee on Nursing Careers
American Nurses' Association
10 Columbus Circle
New York, New York 10019

For further information on licensed practical nursing only, write to:

National Association for Practical Nurse
Education & Service
1465 Broadway
New York, New York 10036

National Federation for Licensed
Practical Nurses
250 West 57th Street
New York, New York 10017

Home Health Aide and Homemaker

Nursing agencies and social service agencies concerned with assistance to the homebound have come to rely with increasing frequency on two relatively new categories of worker—the home health aide and the homemaker.

Although the duties of the two often overlap, the home health aide, sometimes called home aide or visiting health aide, is more involved with the physical and simple health needs of the homebound, or disabled person, while the homemaker concerns herself mainly with the standard housekeeping services.

For the home health aide, typical assignments might include bathing or exercising a convalescent person, or semi-invalid; seeing to it that the patient takes her medicine; keeping in touch with the nurse or doctors, as to the patient's condition. She would also assist in the preparation of meals and help feed the patient.

The homemaker would do the cleaning, shopping, and cooking for an invalid or a handicapped person. She might take care of the children and keep house while the mother is in the hospital or is sick at home and unable to take care of the family.

The agencies most likely to employ and assign these workers are local health departments, welfare dependents, private social work agencies, hospitals, or community voluntary agencies.

The homemaker and home health aide are recruited primarily from among mature women who have had experience in bringing up their own families, also from among young people seeking job training. Training courses range from 40 to 120 hours, and combine instruction in homemaking and home health care. These are generally provided by local schools (adult education), the Manpower Development and Training Act program of the Federal Government, and hospitals and voluntary agencies. The courses include training in household management, nutrition, infant and child care, and personal care. On completion of class work, trainees receive on-the-spot training, working under the supervision of a public health nurse, social worker, occupational therapist, nutritionist, or other professional. A few States, including New Jersey and California, require certification, obtained after a training course of specified minimum length, for home health aide positions.

Opportunities exist for advancement to occupational and physical therapist assistants and aides in hospitals and visiting nurses services.

DOT Code:	Home Health Aid	354.878–014
	Homemaker Aid	306.878–010

For further information, write to:
National Council for Homemaker-Home
Health Aide Services, Inc.
1740 Broadway
New York, New York 10019

Nurse-Midwife

A nurse-midwife is a registered professional nurse who has successfully completed a recognized program of study and clinical experience in obstetrics, leading to a certificate in nurse-midwifery. She provides prenatal, intra partum, postpartum, and family planning care that is geared to the individual needs of each mother. Nurse-midwifery stresses the importance of offering guidance, emotional support, and reassurance to each mother.

Duties

During prenatal care, the nurse-midwife performs the total physical examination of the mother, including breast examination, abdominal palpation, complete pelvic examination and evaluation, and takes the Papanicolaou smear. She provides warmth and support to the woman in labor, encouraging her to participate in the birth process according to her wishes and limits. As long as the course of labor is normal, the nurse-midwife will manage the labor and perform the delivery. The obstetrician to whom she is responsible is consulted whenever there is any deviation from the normal. Any treatments, infusions, and medications such as sedatives and analgesia are prescribed by the nurse-midwife, in accordance with the hospital's approved orders for nurse-midwifery service.

At the time of delivery, if indicated, the nurse-midwife performs a pudendal block or gives a local anesthesia prior to performing an episiotomy. She manages the second and third stages of labor and repairs the episiotomy. She provides immediate care of the newborn, and if necessary performs simple resuscitation. She also gives the official Apgar score and signs the birth certificate. She offers support and reassurance to the delivered mother at times of infant feeding, emphasizing an early positive mother-newborn relationship. She performs the postpartum examinations, and counsels, instructs, and administers methods of birth control to mothers seeking help with family planning.

Nurse-midwives are never independent practitioners; they function as part of the obstetrical team. They manage and provide direct patient care with delegated medical authority in municipal and voluntary hospitals as well as with obstetrical groups for private patients. Many nurse-midwives have used their preparation in nurse-midwifery as background for employment in positions as maternal and child health consultants in Federal, State, and local health departments; as supervisors and administrators of maternity care services; in parent education relating to childbirth; as professors and instructors of maternity nursing on all levels of nursing education; and as teachers of nurse-midwifery.

Working Conditions

Working conditions are much the same as for R.N.'s, and qualified nurse-midwives are in great demand today.

The license to practice nurse-midwifery is determined by the jurisdiction or State in which the nurse-midwife is employed. Information may be obtained from local or State authorities responsible for professional licensure. Nurse-midwives are now practicing in the following States—Alaska, California, Connecticut, Florida, Georgia, Illinois, Kentucky, Maryland, Mississippi, Missouri, New Mexico, New York, Ohio, Oregon, Pennsylvania, Tennessee, Utah, Vermont, and West Virginia and in Puerto Rico. Legislation is now underway in many other States to encourage the practice of nurse-midwifery.

Education

Nurse-midwifery education is offered on the post R.N. level, and master's degree level. The post R.N. programs are of approximately 8 months' duration and provide an intensive program of theory and clinical experience leading to a certificate in nurse-midwifery. The master's degree programs are 12 to 24 months long and offer the graduate student an opportunity to earn a certificate in nurse-midwifery in conjunction with a master's degree. Most schools consider it advisable for applicants to have clinical experience in obstetrical nursing prior to entering an educational program of nurse-midwifery.

Schools of nurse-midwifery are approved by the American College of Nurse-Midwives, which means that their graduates are eligible to take the national certification examination administered by the ACNM, and upon passing the examination, the graduates are then entitled to use the official C.N.M. (Certified Nurse-Midwife) after their names.

There are currently about 10 institutions in the United States and Puerto Rico offering basic education to nurse-midwifery, internship programs, and refresher courses. Scholarships are available to eligible applicants in almost all nurse-midwifery programs. Information on admission requirements and financial assistance for study may be obtained from the individual school.

DOT Code: Nurse-Midwife 075.378-030

For further information, write to:
American College of Nurse-Midwives
50 East 92nd Street
New York, New York 10028

Occupational Therapy

Occupational therapy is a form of treatment employed in the rehabilitation of people with physical or mental emotional disability. It engages the patient in selected activities, pertinent to his condition, to help him correct or overcome his particular disability.

In most cases, occupational therapy is only one of several modalities used together to effect the patient's recovery. The occupational therapist, therefore, generally is a member of a treatment team which may also include a physician, physical therapist, speech therapist, nurse, social worker, vocational counselor, and other specialists.

Although physical or mental recovery is the main objective, there is another goal, equally important: helping the handicapped individual adjust to a possible change in occupation.

The profession of occupational therapy occupies an important place in the treatment program of health facilities and institutions throughout the country treating a great variety of physical and mental disabilities.

Occupational Therapist

When the patient is referred by the physician, the therapist makes an evaluation to determine the current level of functioning and to learn more about the patient as a person—his likes and dislikes, hopes and fears, experiences and expectations. After making the evaluation, the therapist can decide which activity would appeal to the patient and have most value for him. The extent and speed of progress is very much dependent on the therapist's professional judgment.

Incapacitated people often resist help because of resentment about their disability and for other psychological reasons. This calls for insight, understanding, and empathy, because the first concern of the therapist is to engage the patient's interest.

Types of Therapy

Many factors enter into the decision as to the type of therapy used: the nature of the patient's disability, the patient's physical and emotional condition, temperament, short-term and long-term goals of the therapy, and so forth.

The kinds of challenges presented are illustrated by the following examples:

Would learning to type help develop hand coordination for the injured airplane mechanic? Once the therapist has gained his interest, he responds eagerly, and the use of a practical skill helps him improve and return to work earlier.

Would weaving be the most beneficial activity for the woman with arthritic fingers? If this would help her to achieve a sense of progress in the doing, and at the same time benefit her therapeutically, the answer would be "yes."

How can a housewife in a wheelchair who has lost the use of one hand manage at home? She is learning how to work with a paring board that fits over the edge of the table upon which a potato has been impaled on a nail. This adapted device makes it easier for her to prepare vegetables without assistance.

How will a little girl develop enough coordination in her movements to eat alone? She needs first to learn to let eyes and hands work together, by tossing a beanbag while sitting at a cutout table. By performing this activity she will eventually develop the ability to feed herself.

Beside the ability to teach and to communicate with handicapped people, and a general background of knowledge in the basic science and medicine, the occupational therapist needs specific knowledge in the various working skills used in therapy. Among these working skills are leatherwork, jewelry making, ceramics, woodwork, metalwork, textile crafts, and printing. He also needs to know the skills of daily living and simple homemaking.

The therapist may also organize educational activities, such as the study of language or creative writing, or he may organize dramatic groups. For activities such as these, he will generally call upon the assistance of a professional in the particular field. Though he cannot himself be an expert in all these activities, the occupational therapist must know enough about them to understand their therapeutic value, and to set them into motion.

Trained men and women volunteers often play an important part in occupational therapy services. These unpaid but skilled workers aid the therapist and, in turn, the patients, by lending their abilities and special talents. The volunteers work under the direction of the occupational therapist.

Often the physical or mental disability is so severe as to make it no longer possible for the patient to perform in his former occupation or profession. In such cases, the therapist may discover some other skill or talent which the patient can develop and use, and this becomes the goal of the therapy. This can be, for the therapist, a very rewarding experience.

One of the occupational therapist's regular duties is to prepare reports for the information of his professional teammates. A report may cover, for example, an account of the progress of a physically disabled patient who has been assigned tasks of increasing difficulty. Or it may cover the progress being made by crippled children in developing muscle coordination through play with therapeutic toys.

Personal Qualifications

The occupational therapist works with people of all kinds and all ages. Their temperaments and personalities are likely to be as varied as their illnesses and handicaps. To gain their confidence, he should have a warm, friendly personality that inspires both trust and respect. Together with these qualities, he should also have ingenuity and imagination in adapting activities to individual needs. The success of his work often depends in large part on his skill in bringing people and activities together in the right combination.

He also needs to be skilled, patient, and resourceful in teaching, since the people he works with present unusual and difficult learning problems. This occupation presents an excellent opportunity to combine an interest in teaching with an interest in helping people in distress and extreme need.

Opportunities

Occupational therapy offers excellent opportunities. The number of therapists grew from 2,000 in 1950 to approximately 11,000 in 1970. Although the majority of therapists are women, an increasing number of men are entering the field. The majority of occupational therapists work in hospitals. A large number of these are employed by the Federal Government, particularly in military and veterans' hospitals. In addition, there is an increasing demand for therapists in general and special hospitals serving children, in community health centers, nursing homes, and rehabilitation agencies. There is expected to be a continuing need for therapists in specialized fields—psychiatry, cerebral palsy, polio, heart disease, and work with the aged.

There may be an expanding demand for therapists in the field of prevention. This would involve application of the techniques of occupational therapy to prevent the development of illness from social or emotional conditions. This would apply mainly to work with the disadvantaged or children with school problems.

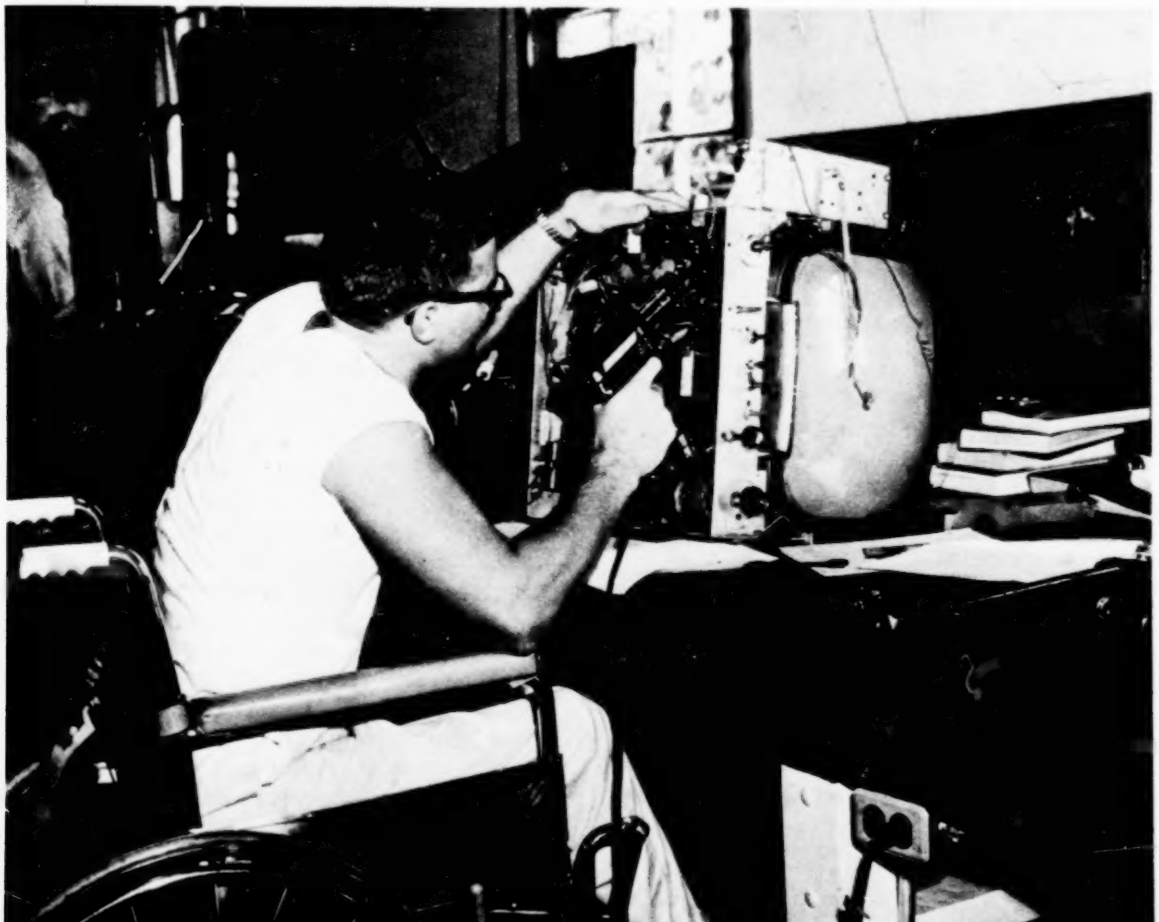
Educational Requirements

Occupational therapy requires 4 years of college training leading to the degree of bachelor of science. There are some minor differences in these courses and it is a good thing to look into them in advance. However, most colleges and universities offering courses in occupational therapy are approved by the Council on Medical Education and Hospitals of the American Medical Association, in collaboration with the American Occupational Therapy Association.

In addition to the 4 years of academic preparation, a clinical training period is required in order to qualify for professional registration. In most schools, this clinical experience takes 6 to 9 months.

For those who already have a degree before enrolling in a program of occupational therapy, there is an advanced-standing course of 18 to 22 months, di-

Through occupational therapy a young man is able to achieve self-reliance and a career.



vided between academic and clinical work. There is also a master's degree program offered in several universities.

Although supervised clinical experience is part of all the approved programs, compensation during this period varies widely. Some institutions offer no compensation at all, others provide maintenance, and still others give a cash stipend in lieu of maintenance.

The college preparation for occupational therapy emphasizes physical and behavioral sciences, such as anatomy, physiology, neurology, psychology, and sociology. Other subjects would include manual and creative skills, educational subjects, and recreational activities.

Students already in college who think they are interested in this field may be able to participate in a summer experience program in occupational therapy. Students selected for this program work 6 weeks during the summer in the occupational therapy department of a hospital. (For more details, see the "for further information" reference at the end of this section.)

Registration

Graduates of approved schools of occupational therapy are eligible to take the national registration examination conducted by the American Occupational Therapy Association. Upon successful completion of the examination, the therapist becomes professionally qualified to practice and is entitled to use the initials OTR after his or her name. In addition to this, he automatically becomes a member of the association.

Related Occupations

As pointed out earlier in this section, the occupational therapist is a member of a treatment team. For related occupations, see the section on Physical Therapy and the one on Specialized Rehabilitation Services.

Occupational Therapy Assistant

The occupational therapy assistant works under the supervision of the occupational therapist. Duties may include instructing patients in manual and creative arts, activities of daily living and other activities. The occupational therapy assistant prepares and lays out work materials and supplies, and assists in maintenance of tools and equipment. He may also assist the occupational therapist to make special orthopedic devices, such as splints and braces. He reports to and consults with the occupational therapist regarding patient progress and possible change in procedures.

Training programs for occupational therapy assistants require high school graduation or the equivalent, and emotional stability as well as physical stamina. Training is offered by (a) an accredited junior community college in a 2-year associate degree program, or (b) an accredited educational institution in a 1-year program, or (c) a hospital or community agency in a 20- to 25-week program. Each of these would include a minimum of 2 months of supervised practical experience. They would also include courses covering structure and function of the human body, growth and development from childhood to old age, physical disability, and mental illness. In addition, there would be training in therapeutic skills and crafts, and activities of living. Graduates of a program approved by the American Occupational Therapy Association are eligible for certification as an occupational therapy assistant and for membership in the association.

DOT Code:		
	Occupational Therapist	079.128-018
	Occupational Therapy Aid (Assistant)	079.368-026

For further information, write to:
American Occupational Therapy Association
251 Park Avenue South
New York, New York 10010

Orthotics and Prosthetics

Until World War II, the average person who lost an arm or leg through injury or disease had comparatively little choice in artificial replacements. Products manufactured by reliable firms were well made, but they were designed by craftsmen who usually had little formal education in anatomy and engineering. Even the surgeons who sent their patients to fitters did not yet have at their command the scientific knowledge necessary to design or select a well-fitting, smoothly functioning arm or leg. In many cases, operations had to be guided not so much by the patient's needs as by what sort of artificial limb was available. People who needed orthopedic devices—braces and supports—also had a limited selection of products, and fitting was often a problem.

With the end of World War II, however, prosthetic research was expanded to meet the needs of some 21,000 amputee veterans—and the even greater number of civilians suffering loss of a limb through injury or disease. Although an artificial limb can never replace a natural one, advances in design, materials, and construction occurring in the last two decades have greatly increased the chances of a normal life for thousands of disabled Americans.

Orthotist and Prosthetist

The prosthetist and orthotist work closely with the physician, surgeon, and therapist to provide total rehabilitation services for the disabled. The prosthetist makes and fits artificial limbs, while the orthotist makes and fits orthopedic braces to support weakened body parts or to correct physical defects, such as spinal malformations. Both work from the physician's prescription, to make devices giving the patient maximum comfort and function. Their work begins after consultation with the patient and with careful and accurate measurements. With this information, they design a device that will meet the individual needs of the patient, constructing it from various materials such as plastic, leather, wood, steel, and aluminum.

Before the work is complete, the patient receives at least one preliminary fitting, enabling the prosthetist or orthotist to make needed changes before finishing the prosthesis (artificial limb) or orthosis (brace). The final step is an evaluation of the appliance, as worn by the patient, by the prosthetist or orthotist, and other rehabilitation specialists. The physical therapist and occupational therapist help the patient learn to use his new equipment.

Personal Qualifications

Anyone who plans a career as a prosthetist or orthotist will need skill with his hands and in the use of tools, as well as considerable mechanical skill and inventiveness. Patience, accuracy, and a keen sense of responsibility are essential. In addition, he should be able to communicate effectively with both patients and other members of the rehabilitation team. Lastly, and of prime importance, he should have a sense of real concern for the welfare of the disabled.

Education and Training

Great advances have been made in prosthetic and orthotic education in the past 10 years. Special courses in prosthetics and orthotics are now offered by several leading universities. These courses are 2 to 5 weeks in duration and are available to persons with some practical experience. The courses include the study of anatomy, biomechanics (study of how the body functions as a mechanical system), engineering as related to prosthetic and orthotic devices, and actual shop experience in orthotic and prosthetic construction.

One university offers a 4-year course leading to the degree of bachelor of science in the field of prosthetics and orthotics. Two other universities offer associate of arts degrees in prosthetics and orthotics. Traineeships for promising students are available from the U.S. Social and Rehabilitation Service, Department of Health, Education, and Welfare.

Until 1971, the basic requirement for practitioner certification was a 4-year apprenticeship program conducted in a facility accredited by the American Board for Certification in Orthotics and Prosthetics, and a passing grade on the certification examination. At present and through 1975, however, a candidate for the examination must have taken, in addition to his apprenticeship, at least three specified short-term courses at one of the colleges or universities accredited by the board. From 1976 through 1979, a candidate will have to have an associate of arts degree in orthotics and/or prosthetics and have had 2 years of clinical experience subsequent to graduation. Beginning in 1980, he will have to possess a bachelor of science degree in orthotics and prosthetics.

In addition to these educational requirements, a candidate will have to present recommendations from three orthopedic surgeons and pass the certification examination.

High school courses recommended for the prospective orthotist or prosthetist include physics, chemistry, mathematics, and biology, as well as shopwork in metal, wood, and plastics. Accounting and business administration courses will be useful to the individual considering the eventual operation of his own facility. A working knowledge of psychology and human relationships is also important in dealing with patients and professional associates.

Orthotic-Prosthetic Assistant and Technician

The orthotist and/or prosthetist is aided in his work by assistants and technicians who are also certified by the board.

The orthotic-prosthetic assistant works under the direct supervision of the orthotist-prosthetist and is responsible for fabricating and fitting devices. He is closely involved in patient care. To become certified, the assistant must possess a high school education or the equivalent, he must have 3 years of accredited apprenticeship training, and he must pass the assistant certification examination.

The orthotic-prosthetic technician is involved mainly in the fabrication of components and devices; he does not take part in direct patient-care activities. To become certified, the technician must have completed the tenth grade, he must have 2 years of nonformal apprenticeship training, and he must pass the technician certification examination.

The prosthetist or orthotist may work in a privately owned facility or in a hospital laboratory, or he may be affiliated with a government agency such as the Veterans' Administration. In small organizations, the same person may fabricate and fit both limbs and braces. In larger facilities, a skilled orthotist or prosthetist may employ one or more assistants and technicians to do the actual construction work under his supervision, while he himself specializes in adjustment and fitting.

Employment in this field is steady, and the skilled orthotist or prosthetist who keeps up with new developments is needed today as never before.

The skilled prosthetist or orthotist can expect a number of tangible—and intangible—rewards. Like other people who provide health services, he will find in his work a deep satisfaction that cannot be measured in dollars and cents. He sees in a dramatic way how his skills help handicapped people to lead happier lives. As he adjusts an artificial limb or brace to make it fit and work better, he may be restoring a man to a paying job or enabling a woman to care for her home and children. It is responsible and challenging work which can bring a feeling of intense personal satisfaction and pride.

Related Occupations

For related occupations, see the section on Biomedical Engineering.

DOT Code:	Orthotist	078.368-026
	Prosthetist	078.368-026
	Prosthetic Assistant	712.281-018
	Orthopedic Appliance-and-Limb Technician	712.281-018
	Orthopedic Technician	712.281-018
	Orthotic Technician	712.281-018
	Orthotic Assistant	712.281-018

For further information, write to:
American Orthotic and Prosthetic
Association
1440 N Street, N.W.
Washington, D.C. 20005

Osteopathic Medicine

The educational principles and professional practice of osteopathic medicine are based on a system of therapy developed by its founders toward the end of the last century. This system stresses the importance of body mechanics to the health of the organism and emphasizes the use of manipulation to detect and correct faulty structure.

In dealing with illness and injury, osteopathic medicine makes major use of manipulative therapy, combining it with the use of drugs, operative surgery, physical therapy, and other methods depending on the individual diagnosis.

Osteopathic Physician

There are seven colleges of osteopathic medicine accredited by the American Osteopathic Association. Their graduates receive the degree of doctor of osteopathy (D.O.).

Minimum entrance requirements for all seven colleges are 3 years of preprofessional college work in an accredited college or university. Over 90 percent of all osteopathic medical students in recent years have completed the regular 4-year college course and received a bachelor's degree before starting their professional training in osteopathic medicine.

Some liberal arts colleges make it possible for their students who have completed 3 years of preprofessional college work to receive the bachelor's degree upon successful completion of their first year's work in a college of osteopathic medicine.

Though specific entrance requirements vary among the colleges of osteopathic medicine, in general they require that the undergraduate college (preprofessional) training should include chemistry, biology, physics, and English. The colleges urge prospective students to begin these subjects while they are still in high school.

Some of the personal qualifications the American Osteopathic Association lists as necessary for success in the field of osteopathic medicine are the desire to serve as an osteopathic physician, friendliness and patience, and the ability to meet and inspire confidence in people. Other characteristics which the association considers desirable include self-confidence, emotional stability, enthusiasm, and perseverance.

Professional Training

All seven colleges of osteopathic medicine are accredited by the American Osteopathic Association. During the first half, basic science subjects are taken, such as anatomy, physiology, pathology, bacteriology, immunology, biochemistry, histology, embryology, pharmacology, and public health. In addition, there is training in osteopathic principles, diagnosis, and practice, including manipulative therapy and other techniques. During the last half, the curriculum includes clinical subjects and practical training in the osteopathic hospitals and outpatient clinics with which the college is affiliated.

After receiving the degree of doctor of osteopathy, most of the graduates serve a rotating internship of 12 months before entering private practice. For this training, they go to one of the 80 teaching osteopathic hospitals which has been approved by the American Osteopathic Association for intern training.

The basic course in osteopathic medicine is designed to train its graduates to be general practitioners. There are opportunities, however, for specialization.

Twelve specialty certifying boards are affiliated with the American Osteopathic Association. These are the American Osteopathic Boards of: Anesthesiology; Internal Medicine; Dermatology; Neurology and Psychiatry; Obstetrics and Gynecology; Ophthalmology and Otorhinolaryngology; Pathology; Pediatrics; Proctology; Radiology; Rehabilitation Medicine; and Surgery.

Licensure

A State license is necessary to practice osteopathic medicine. All States grant such licenses to graduates who fulfill the educational qualifications and pass the required examinations. Licensing agencies in 49 States and the District of Columbia issue unlimited licenses to eligible doctors of osteopathic medicine. Some limitations remain upon their right to use drugs and operative surgery in one State.

State requirements for licensing differ considerably. Specific information can be secured from the licensing board of the State where the student is planning to practice.

Opportunities

Most members of the osteopathic medical profession are in private practice. This involves many of the same considerations as private practice in other fields. The potential advantages of working independently and of increasing one's income with years and experience should be weighed against disadvantages such as long and unpredictable hours.

Although licenses are available to doctors of osteopathy in all States, a 1969 survey indicates that approximately half of the 14,000 osteopathic physicians practicing in the United States were located in Florida, Michigan, Missouri, Ohio, Pennsylvania, Texas, and New Jersey.

According to the American Osteopathic Association, 310 osteopathic hospitals are located in the United States. The majority of practicing doctors of osteopathy utilize these hospitals. In addition, D.O.'s are eligible for admittance to the medical and surgical staff of many tax-supported hospitals throughout the country.

DOT Code: Osteopathic Physician 071.108–010

For further information, write to:
American Osteopathic Association
212 East Ohio Street
Chicago, Illinois 60611

Pharmacy

The pharmacist is much more than a dispenser of drugs and health supplies. The pharmacy is actually a community center for information on topics related to health. Cooperating with other health professionals and health agencies, the pharmacist is in a key spot to promote the health of the people in his neighborhood.

Because of his frequent and close contact with the public, the pharmacist is often the first health professional seen by a person seeking medical help. The pharmacist can, and frequently does, guide people to other health professionals competent to treat their specific health problems. In less severe cases he may offer guidance in the use of nonprescription medication.

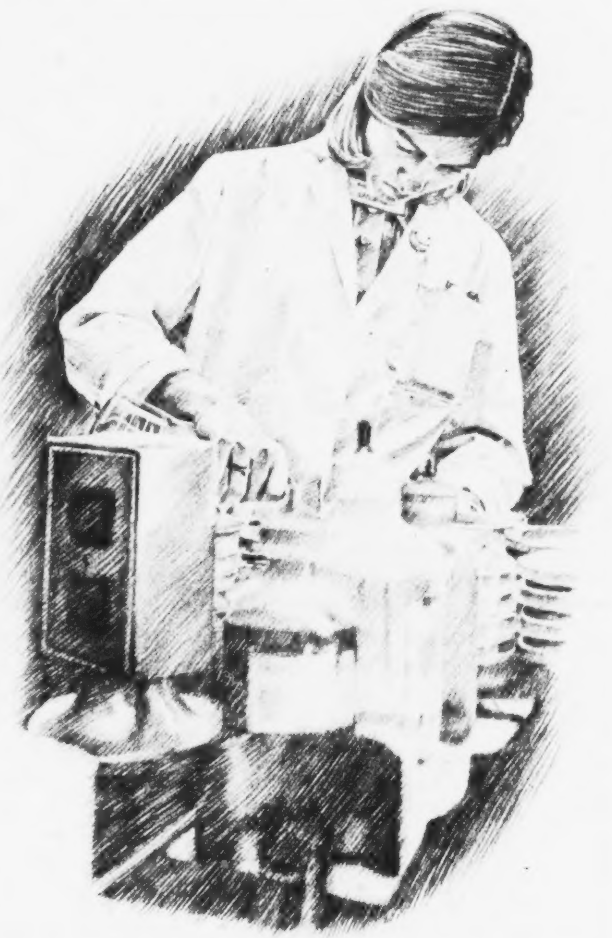
By accepting these responsibilities, the pharmacist has become a member of the professional health team. The demand for his services is steady and is expected to increase with rising standards of medical care and responsiveness to the people's health needs.

Pharmacist

The pharmacist may be found in a variety of work settings, but no matter where he practices his basic functions remain the same. His primary responsibility is to compound and dispense medicine on the order of a physician or other qualified practitioner. To perform his function at the highest standards, he must be fully acquainted with the physical and chemical properties of drugs and the way they behave in the system. He must know how a particular drug will affect a human being, alter the cause of a disease, and react with other drugs being taken. He must also know how a drug may react in laboratory tests of blood and other human tissues.

The pharmacist serving in the community must be proficient in business matters, since he must purchase and sell hundreds of health-related items. In the hospital, the pharmacist may be responsible for the selection and purchase of all medicines used by the facility. In settings where hiring and supervision of personnel is required, the pharmacist will need management ability.

The pharmacist often serves as educator—both to the public and to the health practitioner in the proper use of drugs.



Personal Qualifications

Like the physician or nurse, the pharmacist assumes responsibility for human life. He must be dedicated from the start to conscientious and dependable services. Meticulous regard for accuracy, orderliness, and cleanliness is essential.

The pharmacist's ethics must be unquestionable. He is entrusted with the storage and distribution of dangerous and habit-forming drugs, and must be scrupulous in handling or dispensing them.

A person intending to become a pharmacist should be good in scientific subjects, enjoy working with people, and have better-than-average intelligence.

The number of women entering the profession of pharmacy is increasing steadily. Between 1959 and 1969 the percentage of female pharmacy students doubled. Today 1 student in 5 is a girl.

Women work in all areas of the profession. Many work part time when their family responsibilities become heavy.

Minority Groups in Pharmacy

The opportunities for success in pharmacy for members of the socially and economically disadvantaged segments of society have never been greater, and the profession is making a concerted effort to make these opportunities known. For example, many schools and colleges of pharmacy have undertaken special programs for the recruitment and retention of students from minority groups, and the profession's organizations are working toward greater participation by minority group practitioners in the affairs of the profession.

Education

To obtain a degree in pharmacy, the student must complete either a 5-year or 6-year program of education after graduation from high school. The 5-year program leads to the degree of bachelor of science in pharmacy. The 6-year program leads to the degree of doctor of pharmacy.

Some colleges of pharmacy accept the student immediately after graduation from high school, and offer the full 5-year or 6-year program themselves. Others permit or require the student to take the first

Pharmacists in a hospital pharmacy are an important resource, both for the physician and the patient.

year or 2 years of the 5-year or 6-year curriculum at a college or junior college.

There is no exception to the rule, however, that a minimum 3 years of professsional education must be acquired at an accredited college of pharmacy. In California, only those students who have studied in pharmacy college for at least 4 years are eligible for a license to practice.

There are 72 accredited schools of pharmacy in the United States and in Puerto Rico. The student should write the pharmacy school he hopes to enter to learn about entrance requirements and curriculum and to find out whether or not the school requires or permits him to take the first year or two of the program before admission. The student may choose, for financial reasons, to take his preprofessional courses at a college or junior college near his home.

In high school the student should take courses designed to prepare him for entrance to college. His grades should be good. Colleges of pharmacy do not judge an applicant solely by his high school marks, but these certainly are an important factor. Many pharmacy colleges require applicants to take aptitude tests, the results of which are considered along with the high school marks.

The curriculum in high school should be planned carefully. The general idea is to get as good a background as possible in English, mathematics, history, and government or social studies. Courses in chemistry, biology, and physics are especially helpful in preparing students for the many science courses required in the pharmacy curriculum.

Licensing and Registration

Because pharmacists have such heavy responsibilities and are so closely concerned with the health of the people they serve, all States have strict laws about licensing and registration. These may vary from State to State and the prospective pharmacist is instructed, while still in college, about the regulations applying in areas where he may wish to practice.

All of the States but one require graduation from an accredited school of pharmacy. Almost all of them, in addition, require practical experience, known also as internship. In most States, this requirement can be met by combining clinical assignments done in connection with classwork and experience gained during summer vacations. The student should check internship carefully, since this may weigh heavily in obtaining a license to practice.

Before he can receive a license, the graduate in pharmacy must pass an examination given by the board of pharmacy in the State where he plans to practice. If he passes, he is then registered by the board. Most States honor licenses issued by other States. There are a few exceptions, and the pharmacist will be informed of these while he is still in school.

Community Pharmacies

Of the more than 100,000 registered pharmacists in the country, about 8 out of 10 work in community pharmacies.

There are several kind of community pharmacies, and the range of the pharmacist's professional work depends to some extent upon where he is employed. For example, the strictly prescription pharmacy or apothecary shop handles nothing but drugs and other items related to medical care. In the general community pharmacy, more than half the gross volume of business comes from this source, and the remainder comes from sales of merchandise found traditionally in drugstores—cosmetics, stationery, cameras, and the like. In some pharmacies, sales of general merchandise and fountain sales make up more than 50 percent of the business. In large general merchandising pharmacies, the trend is toward hiring managers trained in business techniques so the pharmacist is utilized more in his professional capacity.

The young pharmacist just out of school usually starts his career as an assistant to the owner or manager of a pharmacy. As he gains experience, he advances to managerial duties. Eventually, he may transfer to a larger pharmacy with expanded responsibilities, or become the owner or part-owner of a community pharmacy or an apothecary shop.

Pharmacists in Health Facilities

One of the rapidly expanding and important areas of practice open to pharmacists is pharmacy service in a hospital, nursing home, extended care center, or clinic. The routine duties of the pharmacist in health facilities are quite similar in many respects to those of the pharmacist dispensing prescription orders in a community pharmacy, but also include highly specialized tasks for which special training and experience are required. The size and character of the facility help to determine the functions of the pharmacist. In some of the larger facilities, there is considerable manufacturing of sterile solutions and drug preparations.

The health facility pharmacist works very closely with the medical staff as well as with the administrator's office. He is the custodian of the facility's pharmaceutical supplies and is responsible for purchasing these and a variety of other related supplies. He acts as a consultant on drug problems, and as the instructor in this field to other members of the facility staff. Frequently he is the monitor for the drug component of treatment. These facilities now employ approximately 10,000 registered pharmacists for full-time work, and in addition perhaps a third that many on a part-time basis. The need for pharmacists to practice in hospitals, nursing homes, and clinics continues to grow, and this practice environment is becoming increasingly attractive to pharmacists.

Smaller facilities frequently depend on nearby community pharmacies for their services or employ a part-time pharmacist. The tendency, however, is to engage a full-time pharmacist who can also take on related tasks, such as handling certain laboratory routines, sterilization of supplies, and administrative duties. Hospitals of 50 beds or more are taking on full-time pharmacists, and those with 100 beds or more find it practically impossible to get along without two or more pharmacists.

Any pharmacist licensed to practice may do so in this environment; however, a pharmacist wishing additional training and experience may become a resident in a hospital pharmacy recognized for high quality of service and facilities. It is also possible to augment or combine this practical experience with a year or more of study at an accredited graduate school associated with a school of pharmacy leading to the degree of master of science in hospital pharmacy. This experience may also be used in the program leading to the doctor of pharmacy degree.

The broad preparation and experience of the hospital pharmacist and his intimate contact with hospital administration may lead to more and more administrative work. If he has a flair for this, he can supplement his education by attending an accredited school of hospital administration, and become fully qualified to step into an administrative post. (For a description of this career, see the section on Hospital and Health Services Administration.)

Other Opportunities

Pharmacists are employed by the U.S. Public Health Service and all three branches of the Armed Forces. Serving as commissioned officers, they can rise to the rank of colonel in the Army and to equivalent ranks in the Public Health Service, the Navy, and the Air Force. Pharmacists are also employed by the Veterans' Administration, where they have civil service status.

Many of the drugs and medicines which pharmacists formerly compounded in their own pharmacies are now produced on a large scale by drug manufacturers. In addition, modern antibiotics, "sulfa" drugs, vaccines, and the like are made only in special plants which rely heavily on research, product development, and product control. This means that the pharmacist's services are needed in a variety of establishments.

The pharmacist who is particularly interested in the scientific aspects of his profession can find employment in the laboratories of pharmaceutical manufacturers. He may go straight to such employment from pharmacy college, but, if research is his goal, he should go on to graduate study in pharmacy, pharmacology, pharmaceutical chemistry, or other pharmaceutical sciences. These are growing fields with excellent prospects for both men and women.

Prospects

The well-qualified pharmacist can be sure that the demand for his services will increase in the future. He can also count on recognition for his contribution to the community.

Pharmacy has a direct relationship to pharmacology and other biophysical sciences. Through the research activities of drug manufacturers as well as of nonprofit laboratories, the development of new drugs and other dosage forms has become one of the major areas of investigation and progress in the health-related sciences. On this front, pharmacy and the research work associated with it have a direct relationship with the occupations covered in Basic Sciences in the Health Field.

DOT Code: Pharmacist 074.181-010

For further information, write to:

American Pharmaceutical Association
2215 Constitution Avenue, N.W.
Washington, D.C. 20037

National Association of Boards of Pharmacy
77 West Washington Street
Chicago, Illinois 60602

American Society for Pharmacology and
Experimental Therapeutics
9650 Rockville Pike
Bethesda, Maryland 20014

American Association of Colleges
of Pharmacy
850 Sligo Avenue
Silver Spring, Maryland 20910

Physical Therapy

The physical therapist, under the direction of a physician, works to rehabilitate people with injuries or disease of the muscles, joints, nerves or bones. The methods of physical therapy include exercise and massage, and various applications of heat, water, light, and electricity.

The physical therapist knows that his skill has helped a young man injured in an auto accident to walk again and lead a normal life; has enabled a child with cerebral palsy to use his arms and legs and go to school; has helped a man who suffered a stroke to regain the use of his arm and return to work.

Physical therapy has value in the treatment of a wide variety of diseases and injuries, such as multiple sclerosis, some nerve injuries, certain chest conditions, amputations, fractures, arthritis, and cerebral palsy.

Physical Therapist

The physical therapist is a professionally trained member of the health team, including physicians, nurses, and other specialists. His job is to help patients overcome their disability through therapeutic exercise, massage, and the use of heat and cold. To carry out his tasks, he must have detailed knowledge of human anatomy and physiology and know what steps may be taken to correct disease and injury.

For example, in the case of a child with a birth defect, the physician calls upon the physical therapist to perform a muscle evaluation in order to determine the extent of the damage. On the basis of the muscle test, plans are made for the kind of physical therapy the child needs. The physical therapist then carries out the plan of treatment.

In working with this child, the physical therapist gives the exercises that bring weakened muscles back toward normalcy. Treatment may include water exercises in warm baths or pools, hot packs, electricity (special currents that stimulate paralyzed muscles), ultraviolet rays, and massage. If the child must be fitted with braces or crutches, the therapist's task is to teach him to walk with the aid of these appliances.

Treatment can be more effective, and progress faster, if the patient and his family understand the purpose and plan and know just how they can play their part. Physical therapy services include instructing patients and their families in how to carry on prescribed treatment at home. They may need specific instruction in the techniques of muscle reeducation, or in the care and use of braces or prosthetic appliances.

In meeting a patient for the first time, the physical therapist, like the physician, keeps in mind the importance of preparing him emotionally for what is to come. He is sensitive to the problems of the patient, made vulnerable by his disability or disease.

Because the treatment may be prolonged and tedious, the full cooperation of the patient will be required. As a first step, therefore, the physical therapist familiarizes himself with the patient's personal background as well as his medical history, and makes an effort to gain his confidence and cooperation. The therapist-patient relationship often determines success or failure in involving the patient in his own treatment. This is especially true of children, and here, of course, the therapist must do his best to help the parents as well as the child to understand the treatment.

Qualifications and Education

Adaptability, emotional stability, tact, an outgoing personality and a pleasant appearance are "musts" in this profession. Physical therapy also takes a great deal of patience and the ability to work toward a long-range goal, even though the progress may sometimes seem slow. Manual dexterity is im-

A physical therapist demonstrates a theraputic exercise to help a patient regain mobility of his hand.

portant. At least average weight and height are desirable, but strength as such is subordinate to good health.

There are three basic plans of education for physical therapy: four-year bachelor's degree courses; 12 months' certificate courses for students who hold bachelor's degrees (offered in 15 schools); graduate training leading to a master's degree for students with a bachelor's degree and the requisite background.

More than 52 colleges and universities offer fully accredited physical therapy programs. Essentially, the course is divided into several areas: A liberal arts program emphasizes the humanities and social studies. Study of the biological sciences includes anatomy, physiology, and pathology. Major emphasis in physical sciences is on chemistry and physics, including the fundamental principles of mechanics, thermodynamics, light, sound, and electricity. Specialization courses provide the fundamental knowledge and skills required to treat patients. Finally, supervised clinical practice completes the course.

The new graduate will profit greatly by working for at least 1 year after college under the supervision of a qualified and experienced physical therapist. More and more institutions are requiring that the graduate have this year of supervised experience as a qualification for employment.

Registration is required for practice in 49 States, the District of Columbia, and Puerto Rico. The prospective student can secure additional information by writing the specific State board of examiners.

There are several sources of funds available in the form of loans and scholarships for education in physical therapy. A list of these public and private sources has been compiled by the American Physical Therapy Association and is available on request.

Opportunities and Prospects

Physical therapy is a rapidly growing field. Ac-

Physical therapists and corrective therapists may work with patients in the use of prosthetic appliances.

cording to the Public Health Service, approximately 14,000 persons were working as physical therapists in 1970, an increase of 2,000 over 1963. The need for trained workers is expected to exceed the supply for years to come. Opportunities are ample for both men and women, although women predominate in the profession (75 percent).

A wide choice of employment opportunities exists. A great many therapists hold positions in general hospitals and in specialized institutions such as those for children, veterans, and people with orthopedic conditions or chronic diseases. Many opportunities also can be found in rehabilitation centers throughout the country, where patients come for the care and training that will enable them to gain confidence and independence.

An increasing number of large industrial firms have physical therapy departments in the medical clinics serving their plants and offices. Also, the need is growing for physical therapists in schools for crippled children. Or a physical therapist may join the Armed Forces with an officer's commission and serve in an Army, Navy, or Air Force hospital. Physical therapists also are employed in the hospitals of the U.S. Public Health Service. (The availability of part-time employment should be an attraction for women with domestic responsibilities.) Physical therapists are also needed in teaching and in research.

Because of the shortage of physical therapists, caseloads are heavy. Job security is a great advantage in this field, however, and opportunities for advancement are expected to remain excellent. Moreover, this branch of the healing arts offers unusual satisfactions—the service the therapist gives can quite literally help men, women, and children learn to walk again. By its nature too, it has never-ending variety and challenge.

Physical Therapist Assistant

The physical therapist assistant is a skilled technical health worker who assists the physical therapist in patient treatment programs and in other activities necessary to the operation of a physical therapy service. He must graduate from a 2-year college with an associate degree in physical therapy.

At the moment, eight States have amended their physical therapy practice acts to include physical therapist assistants. Procedures for licensure or registration in these States are similar to those for professional physical therapists. It is expected that more States will amend their physical therapy practice acts in the near future. In States which have not amended their laws, assistants may practice without a license. For information about licensure or registration in the State in which you wish to practice, write to the board of medical examiners in that State.

Physical therapist assistant programs are located in community or junior colleges accredited by the appropriate regional accrediting agency. These are 2-year programs which lead to an associate degree. The course of study includes biological, physical, and social sciences; humanities; physical therapy technical courses; and clinical experience. Graduates of these programs will qualify as physical therapist assistants.

Physical therapist assistants who wish to become professionally qualified physical therapists may return to college or university to complete their bachelor's degree and obtain certification or registration as a physical therapist.

A list of developing educational programs for physical therapist assistants is available from the American Physical Therapy Association.

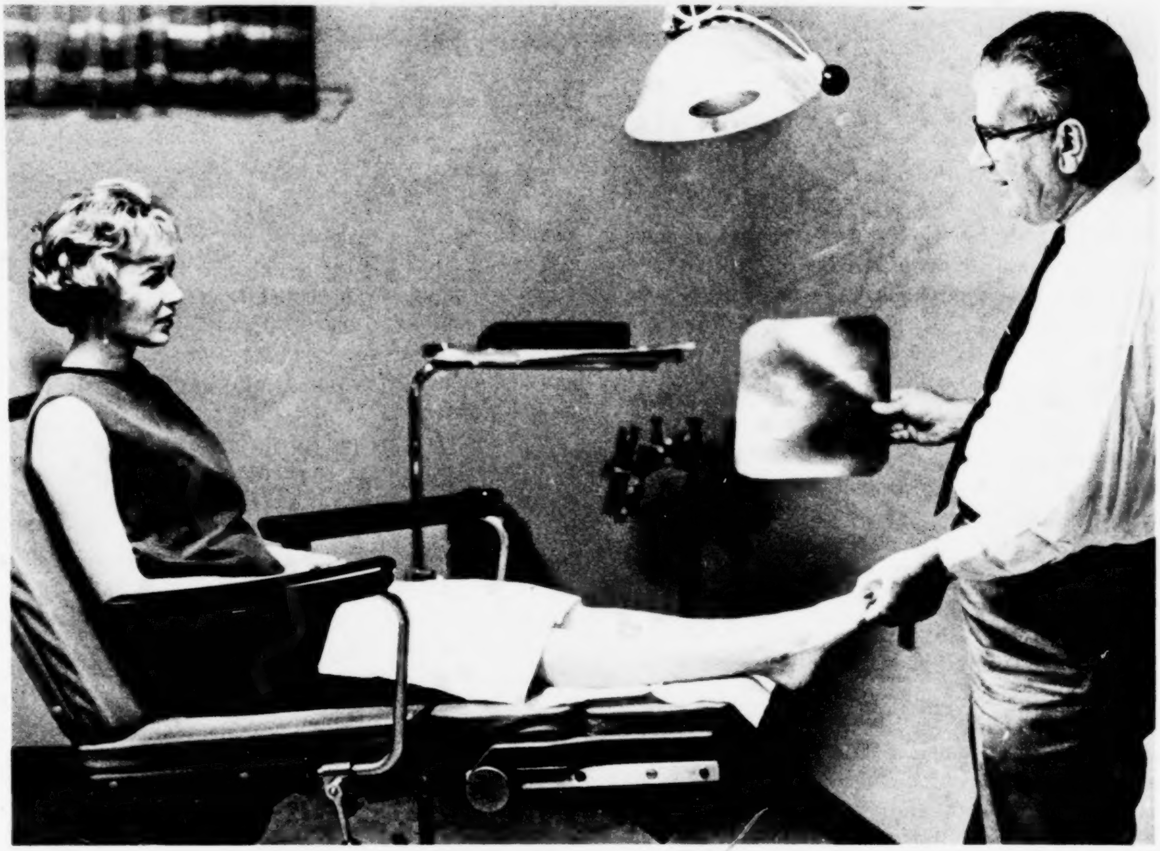
Physical Therapy Aide

The physical therapy aide is a worker whose primary function is to perform designated routine tasks related to the operation of a physical therapy service. He may also assist with patient-related activities, which are predetermined for each patient and assigned by the professionally qualified physical therapist.

No colleges or universities offer training for aides. This is a nonlicensed position open to those who are 18 or older and who have completed on-the-job training. Those who are interested in becoming aides should contact the chief physical therapist or personnel director of their local hospital.

DOT Code:	Physical Therapist	079.378-034
	Physical Therapy Aid	355.878-014
	Physical Therapist Assistant	079.378-035

For further information, write to:
American Physical Therapy Association
1156 15th Street, N.W.
Washington, D.C. 20005



A podiatrist explains the nature of an injury to a patient.

Podiatry

The podiatrist is a professionally trained foot-care practitioner whose services supplement the medical care provided by the physician. Within his own field, the podiatrist is an active member of the health team. Since 3 out of 4 people have foot troubles, a very important need in health services is being filled by podiatry.

Podiatrist

The podiatrist diagnoses and treats diseases and deformities of the feet or tries to prevent their occurrence. The problems he deals with range from a simple corn to foot difficulties requiring special shoes or foot appliances. He consults with other medical specialists concerning further medical treatment.

Podiatrists must be alert to a patient's general health, too. Sometimes a disease like diabetes or hardening of the arteries will produce symptoms in the feet or legs. If the patient is not already under the care of a physician, the podiatrist will urge him to get medical treatment promptly. In turn, people with diseases that affect the feet may be sent by their physicians to a podiatrist for auxiliary care.

The podiatry field is far from overcrowded. Twenty-two million patients were served by podiatrists in 1970. The expanding population with its greater number of older people has resulted in an increasing demand for podiatrists. The podiatrist's practice ranges from office treatment and surgery to consultation with specialists in every area of health. Most podiatrists are self-employed, working in their own offices or in professional buildings with other specialists. Many others serve on the staff of hospitals and treatment centers, in government health programs, and the Armed Forces. Some teach in colleges of podiatry and some do research work.

Necessary Aptitudes

The podiatrist must have deft hands, steady nerves, and good vision. A knack for mechanical work is helpful, since the podiatrist uses quite a bit of electrical equipment and must be able to make or adjust such devices as casts, braces, and splints.

Out of 8,200 podiatrists in practice in 1970, and 1,175 students in training, only about 6 percent were women. There is no reason why the number shouldn't be greater—qualified women students are accepted readily by schools, and the work done by podiatrists is not strenuous. Giving foot care to children might appeal particularly to women considering this career.

Training

To become a podiatrist, a student must complete a 4-year course at a college of podiatry. Anyone planning to enter a college of podiatry must be a high school graduate and must have completed at least 2 years of college work.

One-year and 2-year residencies are available to students who want further experience or who must have extra practical training to meet licensing requirements in certain States.

There are only five accredited colleges of podiatry in the United States. For this reason, the student interested in this field should obtain a list of the schools from the American Podiatry Association and write to the school of his choice before starting preliminary college work. He can then plan his courses to match school requirements. Scientific subjects are emphasized in college as well as in the 4 years of professional study. Colleges of podiatry grant the degree of doctor of podiatric medicine (D.P.M.).

State Licensing

After he graduates, the student must pass a State board examination to obtain a license to practice. This examination is given by the board of podiatry examiners or board of medical examiners, depending on the State. All States license podiatrists, and most of them recognize as valid the licenses granted by other States.

The Podiatrist's Future

Once he obtains a license, the beginning podiatrist usually opens his own office. This calls for an original outlay—he needs supplies, tools, and basic mechanical apparatus as well as customary office furnishing. If he lacks the capital to start on his own, he may be able to go into the office of an established podiatrist as an associate. There are possibilities with the Armed Forces and government health services.

Like all other professional people, the podiatrist with his own office may have some financial difficulties the first year or two. Patients may be few, and hours will have to be flexible; he must schedule evening and Saturday appointments for people who work during ordinary office hours and for school children. But if the podiatrist has both ability and a genuine desire to be of service, his practice should begin to increase within these first starting years.

Earnings vary widely, depending on the community. As a rule, they compare favorably with those of other health professionals who have spent similar time in training.

Although most podiatrists give general foot care to a general clientele, some become particularly interested in specialized work. This might be with children, older people, or industrial workers, or with the treatment of foot deformities. Some podiatrists may prefer to teach, either full or part time, or do research on foot ailments. Men and women with top qualifications sometimes act as consultants for various private and government health agencies, and for hospitals.

The licensed practitioner who wants further training in his field can take advanced courses in colleges of podiatry, for which he will receive a certificate. He can also attend frequently scheduled seminars and scientific meetings.

DOT Code: Podiatrist 079.108-030

For further information, write to:
American Podiatry Association
20 Chevy Chase Circle
Washington, D.C. 20034

Psychology

Psychology is the science of human behavior. Because it is concerned with the way people act and the reasons they act the way they do, it has an important place in the health field, as it has, of course, in many others.

As a health career, psychology is one of the allied professions devoted to mental health. Along with psychiatry, psychiatric nursing, and psychiatric social work, psychology makes a contribution both to the prevention of mental illness and to its diagnosis and treatment. As distinguished from psychiatry—which is a branch of medicine—psychology is a nonmedical science. As distinguished from psychiatric social work, psychology looks first at the individual and his reaction to circumstances—family, job, and so on. The psychiatric social worker turns the problem around—looking first at the individual's surrounding circumstances and relationships.

More information about the other members of the mental health team will be found in the sections on those particular professions.

Clinical Psychologist

This is the name used to identify the psychologist who works in the hospital, clinic, or similar medical setting. He assists in the diagnosis and treatment of individuals with mental and emotional problems and illnesses. He designs and conducts research either alone or in conjunction with physicians or other social scientists. Though the emphasis may differ a good deal from one position to another, all clinical psychologists have this in common—they apply their scientific knowledge of human behavior to the care and treatment of the handicapped and the disturbed. Their purpose is to help the individual who is maladjusted or a misfit to learn new and better habits of behavior, so that he can find a more satisfactory way of living.

The clinical psychologist works directly with the patient to find out everything he can that will help him understand the problem. He may also talk with other people—family, friends, physician, teachers, and others—to round out this background. He consults with the psychiatrist, social worker, and others concerned in diagnosis and treatment.

Counseling Psychologist

The counseling psychologist might be called a specialist in "average man's" everyday problems, as compared with the clinical psychologist, who is mainly concerned with those who are seriously maladjusted. As a specialist in normal thinking, feeling, and behavior, the counseling psychologist studies individuals as individuals—he tries to find "what makes them tick." His purpose in all this is to help them understand themselves so that they can deal sensibly with their own problems and decisions, and take full advantage of all their interest, abilities, and opportunities.

Emphasis in this kind of of counseling is largely on forestalling mental illness. With the growing recognition of mental health problems, the importance of prevention is becoming better understood. This has resulted in increasing demands on counseling psychologists. They work in many settings, including schools and colleges, industry, and community agencies.

Another great need for their services is in the rehabilitation of handicapped workers. When someone is seriously disabled by illness or accident, it may take many services to help him get back on his feet. He probably needs medical treatment to repair physical damage, but he also needs help in readjusting to his place in the family and the community, and to his job. This is where the counseling psychologist comes into the rehabilitation picture. The help he gives the handicapped often returns big dividends in mental health—in renewed courage and self-confidence.

School Psychologist

The school psychologist is concerned with psychological factors involved in the educational performance and general well-being of school age children. He diagnoses needs of gifted, handicapped, and disturbed children and plans and carries out corrective programs to enable them to do school work at their highest potential and to adjust to everyday pressures. To determine a child's needs, limitations, and potentials, the school psychologist often observes the child in the classroom and at play, studies school records, consults with teachers and parents, and administers and interprets various tests. He may serve as a consultant to school administrators and parent-teacher groups in matters involving psychological services within the school system.

About 2,100 school psychologists were engaged in 1969 in health-related activities, such as testing retarded youngsters and conducting therapy sessions with emotionally disturbed children.

Social Psychologist

This specialist differs from the clinical or counseling psychologist because he is mainly concerned with group reactions and behavior—in contrast to concern with the individual. He studies, for example, the ways in which our social attitudes develop, and how the individuals who make up families and neighborhoods and communities react upon each other. To take just one rather simple example of social psychology, consider how all of us get our ideas about traffic accidents and why we do, or don't, feel a sense of responsibility about highway safety. Social psychology, then, could turn out to be a life-and-death matter in this society-on-wheels. The relationship between social psychology and health is just beginning to be explored, and the prospects are that it will be given more and more study. However, over 40 percent of 417 social psychologists surveyed in 1969 considered themselves to be working in the health field.

Psychologist on the Mental Health Research Team

Psychology is basically a research profession, and the psychologist is in most instances the research member of the mental health team. Every practicing psychologist is also, to some extent, a research scientist; the proportion of his time spent on research depends, of course, on the nature and setting of his work. In addition, many psychologists devote themselves almost exclusively to research of one kind or another. The science of psychology is one of the main sources of our increasing understanding of mental capacity and intelligence, and of the effect of emotions on health. Psychological research is continuously contributing to improvement in methods of diagnosing and treating mental and emotional disorders or, still better, of preventing them.

Perhaps the most familiar products of psychological research are what most of us know as mental tests. When reference is made to someone's I.Q. for instance, what is really meant is his intelligence quotient as determined by psychological measurement.

This science—measuring people's mental, emotional, and social characteristics—is called psychometrics. Though there are many other special fields of psychological research, scientific measurement is basic. The tests devised by measurement psychologists are used in all fields of applied psychology—clinical, counseling, social, and other. Every practicing psychologist combines skills in giving and interpreting tests with all the other professional skills involved in interviewing, diagnosing, and providing guidance.

Psychometrist

The psychometrist specializes in administering psychological tests and interpreting the results. Some of these are verbal tests, designed to elicit responses which give clues to personality traits or psychological difficulties. The psychometrist must detect these clues and interpret them. Other tests employ many kinds of apparatus and physical objects to be manipulated in various ways, as, for example, the "Wiggly Block" test designed to show capacity for handling space relationships. To give these tests and to help interpret the resulting scores, the psychometrist must know not only how to administer them but also how they were devised by the psychometric research scientists, what their purposes are, and their limitations.

The psychometrist is not as highly trained as the psychologist and often works under a psychologist's supervision. This work is less complex than that of the psychologist. Even so, it involves a whole battery of skills, including mathematics and statistics. Training for this calling ordinarily takes a master's degree in psychology, requiring 1 year's study after graduation from college, plus a year of supervised experience.

The Profession as a Whole

Training and Qualifications

Anyone who looks forward to continuing advancement in the field of psychology cannot stop with a master's degree. Some of those now practicing in some few specialties have only had 1 or 2 years of graduate study. But more and more positions are open only to men and women who have had at least 4 years of graduate training in psychology, including a doctor of philosophy (Ph.D.) degree, together with at least 1 year of internship in supervised clinical experience.

Beyond this, the top in formal recognition is that of the diplomate in psychology. This is similar to the recognition accorded by the various medical specialty boards. Becoming a diplomate takes at least 5 years of experience beyond the Ph.D., plus an examination before the American Board of Examiners in Professional Psychology.

In psychology, specialization comes mainly in the graduate years. But anyone considering a career in psychology would find it helpful to get a good start in mathematics, science, and possibly foreign languages. High school would not be too soon to begin working in this direction, and college should follow along similar, but broader lines. Those planning to go on to a doctorate degree are not necessarily required to major in psychology as undergraduates in college—though it would probably be a good idea to take some general introductory courses. In the main, however, college should be the time for all-around education, as background for the intensive specialization of graduate work in psychology. Biology, physiology, and other physical sciences; mathematics and statistics; social sciences, literature, art, and philosophy—all these are useful. Training in writing, speaking, and in group relationships may be particularly helpful. Much of the psychologist's work will involve getting ideas across to other people—patients and clients, co-workers and students, and sometimes to the general public. The future psychologist should be prepared to handle this side of his work, too.

A career in psychology demands maturity, skill in understanding and interpreting abstract ideas and in explaining them clearly and convincingly, a sincere interest in people, and the gift of dealing effectively with those who are difficult and disturbed. The psychologist also needs the capacity to stand off and view people's problems in scientific and statistical terms.

Help in financing graduate training is available from various sources, among them several government programs. In this field as in most others, graduate students can get part-time jobs and useful experience as teaching or laboratory assistants. (See also the section on Financial Aid.)

Prospects

Ways and means of paying for graduate training are particularly important because the trend seems to be toward more and more emphasis in psychology on the doctorate degree. Advancement in the mainstream of professional psychology is likely to be difficult without a doctorate.

For the fully qualified psychologist, the health field offers a wide range of opportunity—in general and psychiatric hospitals, in the Armed Forces and in veterans' hospitals, in mental health clinics and centers for the rehabilitation of the handicapped, in Federal and State public health agencies, in school and community health services, in the health programs of large industries, in group practice, and in private practice. Geographically, the distribution is countrywide, but, by and large, psychologists work in good-sized cities rather than in small towns. Women make up over 30 percent of the number of employed psychologists.

Though some psychologists are in private practice, most of them hold salaried posts in public and private institutions or in large industries.

Well-qualified psychologists can count on a better-than-average prospect of financial security once they are established. The institutions where most of them work are likely to have a good deal of stability, and there is a continuing demand for well-trained people.

Status and Standards

Forty-two States, the District of Columbia, and four Canadian provinces license or certify psychologists. The typical requirements for such legal recognition include a doctoral degree and 1 or 2 years of qualifying experience. As time goes by, State laws governing the practice of psychology will probably become universal.

In addition to legal standards, psychologists work under a code of professional and scientific ethics established to protect the public and the profession from quackery and incompetence.

Related Occupations

Though the psychologist works in close cooperation with other members of the mental health team, this is a well defined scientific field. As professions which are also concerned with problems of human behavior, sociology (a social science) and psychiatry (a medical specialty) have similar interest.

DOT Code:	Clinical Psychologist	045.108–022
	Counseling Psychologist	045.108–026
	Psychometrist	045.088–030
	Social Psychologist	045.088–026
	School Psychologist	045.108–034

For further information, write to:
American Psychological Association
1200 17th Street, N.W.
Washington, D.C. 20036

Radiologic Technology

The X-ray is widely used in modern medicine. With this powerful tool, the physician can take pictures of bones and inner organs of the body and detect abnormalities. He can also use its penetrating radiation to halt certain diseases.

In the old days, all X-ray work had to be done by the physician himself. Now that equipment has been improved and safeguarded, trained assistants can do many of the technical routines, conserving the physician's time for administering X-ray therapy and other types of radiation treatment, and for interpreting X-ray films. These assistants may be more familiar as "X-ray technicians." Radiologic technologists are in increasing demand, and for many more years the number of jobs probably will exceed qualified people to fill them.

Within the field of radiologic technology, three areas of specialization are now recognized.

Diagnostic X-Ray Technologist

The diagnostic X-ray technologist operates X-ray equipment to make radiographs (on X-ray film) of various parts of the body. These are used by the physician in determining the extent of the patient's illness or injury.

Nuclear Medicine Technologist

The nuclear medicine technologist operates radioscopic equipment, such as scintillation detectors and scanners, to produce scanograms and measure concentrations of radioactive isotopes in specified body areas and body products. Radioactive isotopes are administered to the patient by the physician and show up on the scanograms, enabling the physician to make diagnosis and determine treatment.

Radiation Therapy Technologist

The radiation therapy technologist operates X-ray therapy machines and may prepare, administer, and measure radioactive isotopes as specified by the radiologist.

The Profession as a Whole

Personal Qualifications

Presently, more women are employed as radiologic technologists than men. But more young men are taking up this profession.

Becoming a medical radiologic technologist calls for a combination of aptitudes. Since the technologist deals directly with patients, he must be gentle and sympathetic. He uses a great deal of equipment, which means he must be deft with his hands and intelligent about machinery. He needs to have a flair for science in order to master necessary techniques. Most important of all, he must be accurate

Diagnostic X-ray technologists prepare a patient for a radiograph on X-ray film.

and careful, since errors are not only costly, but may be dangerous to the patient.

Anyone planning to enter this kind of work should be in normal good health. The possibility of danger to the technologist from continued work with radiation used to cause great concern. However, advances in equipment, techniques, and training have reduced this possibility. Today the technologist can feel secure about his health if he follows accepted practices. All good hospitals have safety procedures and insist that employees follow them.

Education and Training

These positions on the health team are good spots for young people who would like to work in a professional atmosphere, yet who, for one reason or another, cannot spend more than 2 years on post-hign school studies.

Graduation from high school is the first step. Physics, chemistry, biology, and general science are "must" subjects, and the student should also have a good background in algebra, geometry, and English.

Each of the three disciplines has its own curriculum, varying in length from 1 to 2 years, and each has its own certification examination administered by the American Registry of Radiologic Technologists.

The easiest and least expensive way to get required technical training is to enroll in one of the approved schools conducted by hospitals or medical colleges that give specialized training. Most of these courses last 24 months, though several extend over a 4-year period and entitle the graduate to a degree of bachelor of science in X-ray technology.

Many experts believe that a year or two of college work, with courses in physics and chemistry, will provide better preparation for future work in this rapidly expanding field. At present, however, only a few schools require this.

Anyone planning to take radiologic training should write to the school of his choice and ask about entry regulations. Enrollments are small—two to six students is the average.

Tuition is no problem for the young person who receives training at hospital schools. Most of them have no tuition charge—and, in many of these hospitals, the student radiologic technologist is paid a small stipend.

Only technologists graduated from training schools approved by the American Medical Association will be accepted for certification by the American Registry of Radiologic Technologists.

Status and Standards

After completing training, the radiologic technologist should either be registered or eligible for registration with the American Registry of Radiologic Technologists. (This is a requirement for employment in many hospitals, laboratories, and clinics.) By passing an examination, he can become a registered radiologic technologist and may use the letters R.T. (ARRT) after his name.

Getting Started

Well-trained radiologic technologists have a wide choice of places to work. About one-third of them are employed in public or private hospitals. Others have jobs in private medical laboratories supervised and operated by physicians, in physician's offices or privately operated medical clinics, in public health laboratories, in industrial plants, and in dentists' offices or dental clinics.

The number of hours worked weekly depends to a large extent on the institution. For example, hospitals tend to ask for longer hours than do public health laboratories. If around-the-clock service is maintained, some technologists must be on call at all times, and this means that each member of the staff must take a share of weekend and night duty.

Advancement and the Future

Women who'd like a job that can be combined, if necessary, with marriage and raising a family will be interested to know that radiologic technologists are often hired on a part-time basis. These part-time workers help at peak hours during the day or week, substitute for vacationing staff members, make themselves available for emergency calls, or serve small hospitals or clinics which do not have enough X-ray work to warrant a full-time job.

Because the radiologic technologist must work under the direction of a physician or dentist, he can advance in the job only by becoming skilled enough to supervise other workers who are less well trained. This means he will have to seek employment in large X-ray departments, where a number of assistants are needed.

Another way in which the technologist can work his way up—both financially and professionally—is to learn how to operate other hospital and clinical apparatus. Large hospitals may offer a higher salary to the radiologic technologist who has several skills, and smaller institutions frequently give preference to such a versatile assistant.

DOT Code: Radiologic Technologist 078.368-030

For further information, write to:
American Society of Radiologic
Technologists
645 North Michigan Avenue
Chicago, Illinois 60611

Social Work

Patients aren't just "cases"—they're people. Family, job, living arrangements, money problems—these are just some of the pieces of our daily living that stay with us in illness, as in health. Often, they take on added importance in time of illness.

In many families, the close ties of love and courage are the greatest source of strength. But sometimes the pressures that come from family strain or outside circumstances are a contributing cause in the illness itself. Almost always, they have a direct effect on convalescence. If illness results in serious and prolonged incapacity, if it disrupts home, job, and the whole pattern of living, then anxieties can be so severe as to make what is at best a bad matter very much worse.

Most people and most families, in most cases of illness, can adjust to such problems. But more often than we realize, the problem is too big for them to manage unaided. They need professional help.

By profession and training, the social worker is a skilled specialist in giving this kind of help. There are many social workers who through professional education and experience become specialized in the health field both in medical and psychiatric services. They are skilled in applying professional knowledge to the complex situations people encounter when illness strikes. Together with the physician, they can help people make the most of family stability and strength, and can also help them with problems when a solution of these difficulties is an integral part of recovery.

Medical Social Worker

The medical social worker is skilled in helping a patient and his family handle personal problems that result from severe or long illness or disability. The problem is usually social, emotional, or financial—or all three. But, whatever its nature, it can be severe enough to retard recovery and prolong convalescence. The patient who makes the best response to medical treatment is usually the one who is easiest in his mind. Thus the services of the medical social worker are an integral part of the patient's total treatment.

"I'll lose my job now that this bad heart means I can't carry heavy loads anymore," says one patient. The medical social worker can help him select a job which is satisfactory to him and which the physician agrees will not be overtaxing.

"I can't sleep for worrying about where the children can live," says a hospitalized mother. Again, this is a problem for the medical social worker who knows the family circumstances.

And what of the individual who lives in a boarding house and must suddenly begin following a restricted diet?

Or the child crippled by polio whose family must learn to treat him as a "regular" member of the family as far as possible?

Illness makes the average man's problems seem bigger. But they often are bigger—and may be of crisis proportions. The medical social worker and the patient, and often his family, together think through all angles of the problem to be tackled, which may include not only immediate needs but also plans for convalescence.

These are all human problems—all requiring tact and talent in human relations, professional skill, and judgment. And there is no magic formula.

Social workers are trained to understand people and their personal and social needs. Medical social workers give particular attention to these needs and the related problems that are associated with illness and disability. They know that everyone reacts to trouble in his own way. Some people withdraw, some become defiant, some bluster, and some become irritable. Even if the patient keeps his head and his temper, he may need help.

A great push has developed in recent years to get patients out of hospitals and into familiar surroundings. The social worker has become an important link for the patient between hospitalization and the return to normal life in the community. Along with an understanding of human nature, social work requires a thorough professional knowledge of all the community resources that can be tapped in order to assist the individual, and a thorough familiarity with the community as a whole and its social issues.

The social worker has become an advocate for changes in existing and established community services that must be remodeled to meet the changing needs, thus fostering the health and well-being of the patients. As an advocate, he assists in organizing groups to bring pressure for changes by dramatizing the problems. The social worker tries to mobilize efforts of all agencies to focus attention on the complex aspects of these problems. Frequently, the social worker needs to call on one or another of these resources for special services. The community's homemaker service, for example, may provide a homemaker to look after the family while the mother is in the hospital, or a home health aide to help out when someone who lives alone is convalescing. In other cases, the social worker may need to get the advice and assistance of an employment counseling service, or a child placement agency, or a lawyer, or a schoolteacher, or whoever can help get to the heart of the patient's particular problems.

The medical social worker is one of the essential members of the patient's immediate medical team, which is directed by the physician. The practice of medical social work appeals particularly to men and women who think of health not in the abstract sense of the scientific laboratory but in terms of human living—of people. In short, the job is people, the service an integral part of caring for patients—of all kinds, every creed and color, every field of interest, every type of personality, and with every conceivable human problem.

Education and Training

The skilled practice of medical social work requires the highest quality of professional preparation. A medical social worker must have a bachelor's degree from an accredited college or university.

There are 200 accredited colleges and universities in the United States, and two in Canada, offering undergraduate programs in social welfare that prepare students for direct entrance into social welfare employment or for graduate education. Graduate social workers can attain master's degrees upon completion of a 2-year program at any of 73 accredited colleges and universities in the United States and 4 in Canada. About one third to a half of the semester hours are in field instruction that relate academic work to practical experience. Programs for the doctoral level are available in 23 accredited colleges and universities in the United States and 2 in Canada. A doctoral degree is required for university teaching, advanced practice, policy formulation, and administration. Many scholarships and fellowships are available to qualified students. An estimated 80 to 85 percent of all graduate students receive some sort of financial assistance.

Courses vary from school to school, but all accredited programs cover five major areas of knowledge: human behavior and the social environment; social welfare policy and services; the methods of social work (the process of intervening in the flow of events to help solve a problem or develop a resource); research; and direct engagement in service (field practice). The Council on Social Work Education is the accrediting agency in the United States and Canada for social work education.

In 1970, the National Association of Social Workers opened membership rolls to social workers who had completed social work programs and received baccalaureate degrees from accredited schools.

Personal Qualifications

The successful medical social worker needs a special combination of personal qualities. Objective good judgment, the capacity to stand off and look at all sides of human problems, is as important as warm sympathy. The profession demands a genuine liking and respect for people, and faith in them. Of special importance to the medical social worker is the ability to work as a member of a team.

Prospects

Opportunity for advancement is greater for the worker who has completed graduate studies and attained at least a master's degree.

Medical social workers are employed in hospitals, clinics, public and private health centers; local, State, and Federal public health departments; military and veterans' hospitals; and voluntary health agencies concerned with special groups—for example, crippled children, the blind, the deaf, patients with tuberculosis, heart disease, or cancer, or handicapped people in need of rehabilitation. Experienced medical social workers also teach in universities—in schools of medicine, public health, and social work.

The demand for social workers is far greater than current supply and is growing year by year.

Psychiatric Social Worker

The psychiatric social worker helps people who are mentally or emotionally disturbed. She works as a member of the mental health team along with the psychiatrist, the psychiatric nurse, and the psychologist.

When the patient enters the mental hospital or mental health clinic, the psychiatrist needs to know all about him—his family background and relationships, his early life, his education, work experience, and social interests. She also needs information on the patient's immediate symptoms and the events leading to his breakdown. This is where the psychiatric social worker comes in. Frequently, she is the first staff member, except for the receptionist, to see the patient.

She obtains from the patient—and often from his family, too—a complete personal history. This information, together with the finding made by a psychologist, is of the greatest importance to the psychiatrist, both in understanding the patient's particular illness and in planning his treatment.

But preparing the history of each new patient is only the first duty of the psychiatric social worker in a mental hospital. Since the patient hospitalized for mental illness sometimes requires months and even years of treatment, it is the social worker's job to serve as a continuing contact point between the patient and his family. She interprets the nature of the illness to the members of his family and enlists their cooperation in helping him get well. She also serves as the link between the family and the psychiatrist, seeking out and passing along any information from the family that might be helpful in treatment.

For the hospitalized patient who recovers and is getting ready to go home, the psychiatric social worker paves the way for a smooth return to his family and community. The social worker has become an important link for the patient between hospitalization and return to normal life in the community. If the patient needs assistance in his adjustment to the outside world, it is the psychiatric social worker who keeps in touch and gives him the support he needs.

People with mental or emotional problems usually have family, job, or financial problems, too. The specialized training of the psychiatric social worker gives her insight into these problems and their relationship, one to the other, in the total picture of the patient's illness. Generally speaking, the psychiatrist calls on the social worker to join in helping the patients overcome their problems, and, at the same time, conquer the fears, worries, and prejudices that impede their recovery.

Besides serving in mental hospitals and mental health clinics, psychiatric social workers also serve in several hundred child guidance clinics in the Nation. Here, they help psychiatrists work with children who have personality difficulties or behavior problems, and with their parents and teachers.

Other opportunities for practice in this field are in general hospitals that have psychiatric services; in hospitals for the retarded and epileptic; in Federal hospitals providing psychiatric care; and in courts, community centers, and rehabilitation organizations.

Education and Training

Like social work in general, psychiatric social work has high standards of education and performance. Education and training for psychiatric social work is identical with the education and training for medical social workers, except for some differences in courses and work placement. (See Education and Training under Medical Social Worker.)

Prospects

Mental illness is a major health problem in the United States today, and there are numerous job opportunities for qualified social work practitioners as well as for administrators, teachers, and researchers. Young men and women entering this field can generally find openings in any section of the country in which they would like to work. Communities all over the Nation are establishing or expanding mental health services, and universities are interested in increasing their programs to prepare the required personnel. Almost everywhere, the demand for psychiatric social workers outstrips the supply, and developing programs are gravely handicapped by the shortage of well-qualified personnel. The opportunities for advancement are excellent.

Personal Qualifications

Above all else, the psychiatric social worker needs a warm interest and faith in people, as well as respect for them as individuals and a genuine desire to help those in distress. As in social work generally, an objective attitude, sound judgment, and freedom from prejudices are essential—and so is the capacity for keeping one's feelings in the background. Anyone who cannot control his own feelings while working with others would, in the words of a famous social worker, "be doing a greater social service by staying out of the field." But, the person temperamentally suited to dealing with suffering human beings would find the practice of psychiatric social work one of inexhaustible variety and challenge. There would be deep satisfaction in helping people to lead fuller and happier lives as mature and self-sufficient individuals.

The Profession as a Whole

Career Ladders

The establishment of career ladders is currently being considered by the National Association of Social Workers and is still in the planning stages. The association is studying the feasibility of developing

Medical and psychiatric social workers, specializing in work with young runaways, discuss their experience to further extend the means of providing help.

Nextness is
Godlier than
Cleanliness

training programs for jobs in the social services without the requisite of a bachelor's degree from accredited schools. The career ladder would consist of vocational or in-training programs for first-rung positions, allowing further educational opportunities for those who wish to move up to the more responsible and skilled jobs.

Related Occupations

In professional background and knowledge, social work has a great deal in common with both psychology and sociology. In on-the-job activities and relationships to the patient, it has many similarities with vocational rehabilitation counseling. (For each of these, see the appropriate occupational description.)

DOT Code:	Medical Social Worker	195.108–046
	Psychiatric Social Worker	195.108–050

For further information, write to:

National Commission for Social Work
Careers
345 East 46th Street
New York, New York 10017

National Association of Social Workers
2 Park Avenue
New York, New York 10016

Sociology in the Health Field

Sociology is the science of society. It deals with man as a social animal—his customs, attitudes, and behavior as a member of his particular family, neighborhood, ethnic group, trade union, political organization, church or synagogue, or economic and social stratum.

It seeks to learn how a man's religion, occupation, ethnic customs and prejudices, education, and other factors affect his behavior as a consumer, as a voter, as a family man, as a worker. It also seeks to learn how such factors as these affect a man's health. This knowledge is invaluable for agencies planning public health programs, hospitals and clinic facilities, health education, and similar projects.

The sociologist makes this contribution primarily through research. His laboratory is the world around him and his object of study, the people in it.

Sociologist

Sociologists often specialize in a particular area of research. Some, for example, concentrate on social factors related to illness and its causes—exploring the relationship between national origin or income level and illness rates, seeking clues in group customs, or in the social stress and strain to which a group's members may be exposed. Others study the social sources of our attitudes toward health and illness and of our reaction to professional advice and service. They seek to learn, for example, why some people do not go to the doctor even when they know they should—or, if they do, fail to follow his advice Still others specialize in social organization within the health field and in the social characteristics of individual health occupations—trying to discover, for example, what makes a hospital run smoothly, or what situations put undue pressures on a hospital staff, or how the social climate of a professional school affects its student's attitudes.

Though research is the basic concern of sociologists who work in the health field, some may combine research with other activities.

A considerable number spend part of their time teaching in professional schools, combining this with research.

Sociologists are also frequently called in by health agencies and facilities to serve as consultants on program planning or organization and administration.

Sociologists in the health field work in many settings—in universities; schools of medicine; nursing or other professions; in Federal health agencies; in State and local health departments and government programs for mental health; in large hospitals; and in voluntary health agencies.

The sociologist who has a master's degree and seeks employment in the health field is likely to find his first job as a staff assistant in a fairly large public or private health organization, or as a member of a university research group working on health problems. With more experience, there would be opportunities for advancement in either of these settings.

A doctoral degree is well worth the added investment in time and effort. Without the Ph.D., the choices are likely to be very limited. Furthermore, few people lacking a Ph.D. reach full senior faculty rank in a professional or graduate school or become research director in a major health organization.

Related Professions

Though the number of sociologists specializing in health is relatively small, it probably constitutes the largest group of social scientists in the health field.

A closely related group—the anthropologists—is also represented in the health field, though in considerably smaller numbers. Their interests are very similar to those of sociologists. (For a source of additional information, see the Referral List.)

Economics and psychology are closely related to sociology in the health field. (For a description of each of these professions, see the appropriate section.) Additional professions with some interests in common with those of sociologists in the health field include: public health program analyst, public health educator, health statistician, and social worker.

DOT Code:	Anthropologist	055.088–010
	Sociologist	054.088–038

For further information on graduate programs in sociology, write to:

American Sociological Association
1722 N Street, N.W.
Washington, D.C. 20036

Specialized Rehabilitation Services

Those working to restore the physically or emotionally handicapped to normal or near-normal functioning draw upon a wide range of rehabilitation activities—homemaking, physical education, academic and vocational education, manual arts, music, and recreation.

These are provided through a number of specialized services. For young people whose skills and interests are related to one of these specialties, there is an opportunity for a satisfying and constructive career.

Corrective Therapist

Corrective therapy (also called adapted physical education) is the treatment of patients by means of prescribed physical exercises.

The corrective therapist may be involved in a number of duties:

- Teaching exercise routines to wheelchair patients.
- Teaching the orthopedically handicapped, the amputee, or partially paralyzed patient to walk and move around.
- Giving driving lessons to the physically handicapped in specially equipped automobiles.
- Guiding the blind person to the initial stages of training for independent movement and travel.
- Training the patient in the use of braces, artificial limbs, and other devices.

For the physically handicapped, the exercise routines are aimed at developing strength, dexterity, and coordination of muscles. For the emotionally ill or mentally retarded, the exercise may be used to relieve frustration or tension, or to bring about social involvement.

In addition to administering the exercises, the corrective therapist evaluates strength, endurance, and self-care ability to gage the patient's recovery at successive stages.

Corrective therapy is not the same as physical therapy. The physical therapist (see section on Physical Therapy) employs physical agents such as heat, water, and light in treatment routines, and performs tests to determine nerve, muscle, and skin condition and reaction.

Corrective therapy is used mainly in the more advanced stages of rehabilitation where functional training is required.

The minimum requirement for a career in this profession is a degree in physical education followed by a period of clinical training, usually from 2 to 7 months. Courses for advanced degrees in corrective therapy are available from some universities.

The employment outlook for corrective therapists is good. In addition to the many centers and hospitals operated by the Veterans' Administration, an increasing number of States and private hospitals, rehabilitation centers, and schools are utilizing these services. Veterans' hospitals alone employed 500 corrective therapists in 1970 and average 35 vacancies each year, nationwide.

DOT Code:	Corrective Therapist	079.368–014

For further information, write to:

Association for Physical and Mental
Rehabilitation
105 Saint Lawrence Street
Rehoboth Beach, Delaware 19971

American Corrective Therapy Association
5806 Gloucester Lane
Austin, Texas 78723

Educational Therapist

Educational therapy is used mainly with patients who, because of their disability, are withdrawn, depressed, or agitated, and who feel detached from normal life and reality.

As the name implies, educational therapy is a form of teaching. But the purpose is not so much to impart knowledge as it is to stimulate interest, confidence, and self-esteem; to overcome abnormal moods and emotions; and to restore a sense of connection with the world and other people.

The courses taught are similar to the ones taught in high school—English, chemistry, biology, mathematics; also typing, shorthand, and other commercial courses. However, the content and teaching methods are adapted to the patient's particular handicap, and to the particular purpose for which it is being used.

Although the majority of educational therapists are employed in hospitals operated by the Veterans' Administration, an increasing number of private and State institutions are adding educational therapy to their rehabilitation programs.

There are certain personal qualities that an educational therapist should possess—a sensitivity to underlying moods and emotions; a strong motivation to help the disabled overcome their difficulties; an ability to "reach" troubled people and to communicate with them.

Young people interested in a career in educational therapy should plan on at least 4 years of college study. Emphasis should be placed on the subject matter the student therapist intends to teach. In addition to a college degree, a training period is required. This generally ranges from 2 to 7 months and may be given as part of an in-service training program. Some training centers offer clinical practice for student therapists. Several institutions offer postgraduate training for educational therapists.

As is true with most professional occupations in the health field, additional education is desirable.

DOT Code: Educational Therapist 091.228-010

For further information, write to:

American Association for Rehabilitation
Therapy, Inc.
Veterans' Administration Hospital
Hines, Illinois 60141

Manual Arts Therapist

The manual arts therapist utilizes work activities of an industrial and agricultural nature, in actual work situations, to assist patients in their recovery. If actual working conditions are not available, the therapist may set up his own work situation, making sure that conditions are as realistic as possible.

The primary purpose is to engage the patient in activity which absorbs him, gives him a sense of confidence and achievement, and motivates him to strive for recovery. At the same time, it has a practical value. It serves to retrain the patient in his own skill or trade, or, where the disability makes this impossible, to train him in a new one.

Manual arts therapy may be the only therapy prescribed for a patient, or it may be used together with other types of therapies in an integrated treatment program. It may be prescribed at any stage of hospitalization, depending upon the patient's condition and vocational goals.

The manual arts therapist works with all types of hospitalized patients. Treatment may take place in wards, hospital engineering maintenance shops, hospital agricultural areas, and manual arts therapy clinics (similar to industrial arts workshops).

Metalworking, printing, woodworking, radio and TV repair, and a variety of other job activities are the stock-in-trade of the manual arts therapist. The therapist may give a bedfast patient instructions in leatherwork, or he may direct a large group of mental patients in agricultural activities. A construction worker who has lost a leg in a fall may discover an aptitude for drawing. He will be taught commercial art. An assembly line worker, his hands crippled by arthritis, may express an interest in animal husbandry. It is the job of the manual arts therapist to cultivate these interests and to train the patients in these new occupations.

A college degree, with a major in industrial arts, agriculture, or a related field, is the minimum qualification for entry into this occupation. In addition to a college degree, clinical training, taking from 2 to 7 months, is required by hospitals and rehabilitation centers.

Although the majority of these jobs are found in hospitals and centers operated by the Veterans' Administration, an increasing number of private and public institutions are also using the services of the manual arts therapist. These include prisons and drug addiction rehabilitation facilities.

DOT Code: Manual Arts Therapist 079.128-010

For further information, write to:
American Association for Rehabilitation
Therapy, Inc.
Veterans' Administration Hospital
Hines, Illinois 60141

Music Therapist

Throughout the ages, man has turned to music to express his feeling of joy, despair, love, and hate. For each it serves a different purpose, and for some many purposes. Now, for those who are disabled, music may become an actual part of medical treatment.

Music therapy, the professional application of music to accomplish therapeutic aims, is used to aid patients afflicted with long-term disabilities such as tuberculosis, and with progressive diseases such as muscular dystrophy. For them it offers a new interest to make life more worthwhile. Even more effective is its use with the mentally ill, for music therapy may achieve changes in the patient's behavior that will give him a new understanding of himself and of the world around him. This should serve as a base for improved mental health and more effective adjustment to normal living.

A high percentage of the trained music therapists are now employed in psychiatric hospitals. Treatment is given to patients of all age groups, ranging from disturbed small children and adolescents to adults, who suffer from mental illness of many types and varying degrees of seriousness. As a member of the mental health team, the music therapist devises programs to achieve aims prescribed by the attending psychiatrist. Periodically, the therapeutic results are evaluated.

Recently, there has been a noticeable trend toward treatment of the mentally ill at outpatient clinics, locally administered and staffed, but supported by Federal Government grants. Discharged patients of mental institutions may be under continued observation and receive required treatment there, while others, who have not been institutionalized, may find the attention they need. Customarily the mental health team of the clinic includes a psychiatrist, a psychologist, a nurse, a social worker, and often a music therapist.

Many children with other handicaps profit from music therapy. The mentally retarded, the cerebral palsied, the crippled, and the blind make up a group that is second only to the mentally ill in numbers receiving music therapy. Rewarding personal satisfaction may be expected of the music therapist who works with children.

Music therapists may devise programs of many kinds in an effort to gain and to hold the patient's interest. Much depends upon his suceptibility to training, for what would be within the realm of one would be inappropriate for another. Group singing is commonly used. Musical appreciation and musical education is appealing to others. To the most trainable, instrumental instruction is offered, and, eventually, some of this group may qualify for orchestral work. Every effort is made to improve skills acquired in past years and to develop an intensified musical interest which will, in itself, give a new dimension to normal living.

A baccalaureate degree in music therapy is essential for a career in this field. For those who have a degree in music, the required therapy courses may be taken at graduate school as a part of the work toward a master's degree. Also required, to qualify as a registered music therapist, is a 6-month internship at an approved psychiatric hospital, affiliated for clinical purposes with an accredited music therapy school. In 1971, 18 American colleges and universities were approved by the National Association of Schools of Music to offer the degree of bachelor of music therapy. Registration is administered by the National Association for Music Therapy, Inc.

The demand for registered music therapists exceeds the supply. Approximately 600 were actively employed throughout the United States in 1971. The greatest number served in psychiatric hospitals, but others worked in general hospitals, isolation hospitals, and schools for exceptional children.

DOT Code: Music Therapist 079.128-014

For further information, write to:
National Association for Music Therapy,
Inc.
P. O. Box 610
Lawrence, Kansas 66044

Recreational Therapist

Young people who enjoy sports, drama, or arts and crafts and who have a desire to help in the rehabilitation of sick or disabled people, may find a career in recreational therapy.

Recreational therapy as the term implies, uses recreation in the rehabilitation of people who are ill, disabled, or handicapped. Therapeutic recreation is provided in a hospital or other facility, or in a community setting for patients who have left the institution.

Recreational therapists work with people who are mentally ill, mentally retarded, or physically handicapped.

In many hospitals, volunteers help out in recreational therapy. It is the responsibility of the recreational therapist to give supervision to these volunteers.

High school students who desire to work in the health field in recreation should decide, before entering college, whether they want to work in a variety of recreation activities or specialize in a particular activity. If the choice is for a diversified approach, the student should choose a college offering a degree in recreation. If this is not possible, a bachelor's degree in physical education with courses in art, music, and drama can usually satisfy the educational requirement. But this should be followed by on-the-job training as a recreational therapist. A student with a special interest and a college degree in art or dramatics can also qualify as a recreational therapist, provided he has enough experience in a variety of additional activities to serve as a leader and director.

Employment opportunities are excellent. There are currently more positions open than there are qualified applicants. Many States offer tuition and stipends for study toward a master's degree.

Veterans' hospitals alone employed 600 recreational therapists in 1970 and average 35 vacancies each year, nationwide. The Federal Government also offers traineeships to college graduates in recreation who are interested in the health field.

DOT Code: Recreational Therapist 079.128-022

For further information, write to:
National Association of Recreational
Therapists, Inc.
Eastern State Hospital
Vinita, Oklahoma 74301

Industrial Therapist

Industrial therapy enables mentally ill patients to perform medically prescribed work activities in order to motivate and prepare them to resume employment outside the hospital.

The industrial therapist goes beyond the occupational therapist by giving the patient productive work in a realistic work environment and for pay. Patients are put to work in such hospital assignments as grounds and building maintenance, laundry, kitchen, gardening, and painting. Not only does this work have utilitarian value, but it helps restore a feeling of confidence and self-esteem.

In making a plan for a particular patient, the industrial therapist chooses the work which will have greatest therapeutic value for the particular patient, and which is within the limits of his disability. The plan is made in coordination with other members of the rehabilitation team.

The industrial therapist follows and evaluates each patient's progress. He also handles payroll records and salary distribution.

Most industrial therapists work in State or veterans' hospitals. Frequently, industrial therapists are promoted from the ranks of occupational and manual arts therapists. A college degree in occupational therapy, industrial arts, or a related field is the minimum educational requirement for this occupation.

DOT Code: Industrial Therapist 079.128-008

For further information, write to:
American Association for Rehabilitation
Therapy, Inc.
Veterans' Administration Hospital
Hines, Illinois 60141

Home Economist in Rehabilitation

There is a wide range of needs for the home economist in rehabilitation. The woman who is recovering from a heart attack or tuberculosis, for example, may not be able to climb stairs or do the other activities that she had previously thought routine. Similarly, anyone who is confined to a wheelchair and can no longer use his hands skillfully, or is limited to one hand, will find it impossible to manage in the same old way. Either new ways must be learned to carry out these everyday activities, or someone else must take them over, or they will be left undone.

Men, too, may need the help of the home economist in home management, family finance, nutrition, and other home-related subjects. For men who live alone, learning to manage for one's self around the house can be an important element in convalescence or in adjusting to a permanent disability. There are men who have disabilities which make it impossible for them to be employed outside the home. If they could assume housekeeping responsibilities, it would release other family members for outside employment.

In addition, many older people enfeebled by age might continue to live independently in their own homes for many years if they could be helped to simplify their homemaking and make it less strenuous.

Handicapped children and young people who have been retrained in homemaking could assume an active role in the family, reducing the burden of the parents.

The duties of the home economist in rehabilitation vary according to the type of employment, but can be classified into two categories—direct counseling with the handicapped individuals, and indirect counseling as a resource person for the rehabilitation team.

The home economist in rehabilitation may offer many different trends of help:

- Suggest work plans and management practices to save time and energy.
- Plan kitchen arrangements to make the work easier.
- Assist a patient with a physical handicap (such as blindness or loss of a limb) to perform household duties in a way which will get around the handicap.
- Help patients with difficulty in body control and coordination to develop correct postures and positions.

In the rehabilitation movement as a whole, there is a growing demand for specialists with home economics background and training in occupational therapy to serve as resource persons for the rehabilitation team.

On a full-time basis, specialists often assist with staff training programs, provide service materials, and contribute to research. Acting as a resource consultant, the home economist in rehabilitation provides the rehabilitation team with answers to problems of management with special emphasis on work simplification, nutrition and food preparation, adaptations of clothing, child care, family relations, furnishings, and interior design.

The primary educational requisite for home economist in rehabilitation is a 4-year college education with emphasis in one or more of these areas—home economics, occupational therapy, or social work. Beyond this, there are other recommended background experiences. A qualified home economist in rehabilitation should have graduate or in-service training in the special education of the orthopedically handicapped, blind, deaf, cardiac, retarded, or mentally ill. If she plans to work in a hospital, the consultant should have some hospital in-service training and orientation.

Prior professional work experience may include one of the following: occupational therapy, physical therapy, dietetics or nutrition, hospital or public health nursing, social work, or home economics.

Practical experience in homemaking and child care is extremely important. The consultant should have a clear picture of what it means to do all the work of a normal household.

The American Home Economics Association (AHEA) administers rehabilitation traineeships for home economists who wish to work toward a master's or doctor's degree in rehabilitation.

Personal qualifications are also very important. The home economist in rehabilitation should have a special interest and aptitude for working with handicapped men, women, and children, and be able to inspire their confidence. The consultant should be able to work with people of varying educational and social backgrounds. In addition, the consultant should be flexible and imaginative in her approach to homemaking problems.

There are opportunities in public and private agencies for full-time and part-time home economists in rehabilitation.

The home economist may be employed by public agencies such as the Cooperative Extension Service; and State departments of health, social service, and vocational rehabilitation. Private agencies needing the home economist in rehabilitation include rehabilitation centers, hospitals, convalescent centers, and heart associations.

The qualified economist, and others in fields related to home economics, may become members of the American Home Economics Association.

DOT Code: Home Economist, Rehabilitation 096.128-030

For further information, write to:
American Home Economics Association
2010 Massachusetts Avenue, N.W.
Washington, D.C. 20036

Speech Pathology and Audiology

It is estimated that 1 out of every 20 people in this country has a speech problem which needs treatment.

The people who can give specialized help are known as speech pathologists and audiologists. Their profession is comparatively new. Before it came into existence, people with speech disabilities had hardly any place to turn for help. Few physicians—even child specialists—had been taught techniques for speech rehabilitation; clinical and consulting psychologists were similarly untrained. Recognition of this need brought a new group of specialists into existence—men and women who had studied the physical and emotional factors involved in speech difficulties and who had learned how to deal with them.

Like many other young health services, this field is in great need of additional personnel. Interesting jobs go begging simply because there aren't enough trained people to fill them.

Speech Pathologist and Audiologist

The goal of speech pathologists and audiologists is to help children and adults with speech problems to communicate as nearly normally as possible.

Following are some of the types of programs with which the speech pathologist and audiologist work: lisping, cleft palate, impaired hearing, talking difficulties resulting from cerebral palsy, talking difficulties resulting from emotional or physical disturbance or retardation.

In speech disabilities which have a physical cause, the clinician may need to work with physicians and dentists. When the disorder is emotional in origin, he may need to cooperate with a psychiatrist or a psychologist. A vocational counselor may be brought in if the speech problem is a handicap to employment. Other professional people with whom the speech pathologist and audiologist work are the public health nurse, the social worker, and the school teacher.

Personal Qualifications

Special qualities are called for in people who work directly with handicapped children and adults.

First is a real concern for people with physical and psychological impairment and a sincere desire to help them. Second, but equally important, is the ability to work with such problems objectively. The clinician should have a warm, friendly personality that inspires confidence in the person being helped. Patience and perseverance are also needed, since speech rehabilitation is a slow process. Relating well with children is a definite asset, since most of the work in speech rehabilitation is done with youngsters.

Education and Training

To qualify as a speech pathologist, a person must have a master's degree from a college or community with an acceptable department of speech pathology and audiology. In the attainment of the master's degree, he must complete sufficient course credits in speech and hearing to be certified by the American Speech and Hearing Association.

No special college preparation is required, but the student should be well-advised to take a broad liberal arts education with courses in biology, anatomy, physiology, physics, general psychology, adult and adolescent psychology, sociology, and anthropology. Courses in special fields of study related to speech and language are also helpful. These would include linguistics, semantics, phonetics, and introductory courses in speech pathology and audiology. Professional training, including work at the graduate level, must be taken at a college or university with a program of speech pathology and/or audiology.

The college student will probably decide in his junior year which particular aspect of this profession appeals to him most and then will select his graduate courses with the help of a faculty adviser. Although the curricula leading to a master's degree in speech pathology and audiology vary from college to college, the following basic areas are covered within all professional courses of study: fundamental studies of the processes of normal speech and hearing including anatomy and physiology; acoustics and the psychological aspects of human communications; the nature of disorders of speech and hearing; the measurement and evaluation of speech production, language abilities and auditory processes; clinical treatment and training of children and adults with speech, language, and hearing disorders; and research methodology in the study of speech and hearing. Graduate studies should include preparation in the particular aspects of speech pathology and audiology and related fields which are pertinent to the work the student plans to do. He may concern himself primarily with speech disorders, language impairment, or hearing disorders. However, speech, hearing, and language are so interrelated that professional competence requires familiarity with these three areas.

Opportunities and Prospects

Both men and women are needed in this field. At the present time, about 3 out of 4 clinicians are women, but an increasing number of men are taking up this work. The person trained in speech pathology and audiology has a wide choice of areas where he can be of service. Many public schools need clinicians to work with children with speech troubles. In addition, there are a number of both public and private schools which have been set up exclusively for children handicapped by deafness, cerebral palsy, or other conditions which affect their ability to talk. Speech pathologists and audiologists are important members of the staff of such schools. There are also mobile speech clinics which travel to outlying communities to serve both children and adults.

Other organizations employing speech pathologists and audiologists are social agencies, clinics at colleges, and medical centers. Various Federal, State, and local government agencies employ workers to provide services for crippled children with speech problems and there is a special speech and hearing clinic for members of the Armed Forces.

Many highly trained speech pathologists and audiologists specialize in research work. Others serve as teachers in colleges, medical schools, and training institutions.

DOT Code:		
	Audiologist	079.108–010
	Speech Pathologist	079.108–038

For further information, write to:

American Speech and Hearing Association
9030 Old Georgetown Road
Washington, D.C. 20014

Veterinary Medicine

Today's veterinarian is important to human as well as animal health in ways no one would have thought possible just a generation ago—and his services are in greater demand than ever. The modern veterinarian is needed in so many places that he can pretty much shape his career to suit himself. He can enter one of several types of practice, or undertake various types of research, or go into local, State, or Federal service.

Veterinarian

Looking after the health of farm animals and pets is an occupation almost as old as civilization itself. People living in close association with animals soon realized that they were—like human beings—subject to many ills, which could make them unfit for use as food or unable to work or provide companionship. And, by practical experience, people also learned that animals could transmit many diseases to their owners. In fact, in older civilizations, the same "medicine man" treated both animals and human beings. It was not until many centuries later that veterinary medicine became a separate specialty of the medical sciences.

Nowadays, the veterinarian has the basic responsibility for keeping animals healthy and taking care of them when they're sick or injured. He has also become a key figure in disease prevention among human beings. This is one of the newest developments in the health field, and helps explain why veterinary medicine today is a career with wide opportunities for service.

Work done by the veterinarian usually falls into one of three main categories. He tries to keep animals free from disease by vaccinating them and teaching their owners how to feed and care for them properly. He gives medical or surgical care to sick or injured animals. Finally, he works to protect and promote human health. His observations, research, and treatments have been applied in bettering man's health—in fields of surgery, internal medicine, cancer, tuberculosis, and chronic diseases. He plays an important part, also, in protecting human beings from the various diseases that can spread from animals to man.

It is not hard to see why the veterinarian's work is so important to farmers and pet owners, and to the managers of zoos, circuses, riding stables, and other establishments where animals are grouped together. Sickness among cows, for example, will ruin a dairy farmer financially unless it can be stamped out before the whole herd is affected. But veterinary medicine is just as important—in a less obvious way—to people who live in cities and don't own animals. When they buy milk, meat, poultry, and eggs, they are benefiting from the veterinarian's services—from his efforts to keep food-producing animals in good health, and from his inspection of animal-origin foods.

People in all kinds of communities also benefit from the veterinarian's efforts to stamp out or control those animal diseases which spread to human beings. Twenty of these diseases are a possible threat in this country, with rabies, brucellosis, and a form of food poisoning called salmonellosis heading the list. Keeping these in check is a responsibility shouldered by the veterinarian in cooperation with the specially trained physician or other health official.

Personal Qualifications

To be successful, the veterinarian needs a combination of natural gifts and technical training. He must be fond of animals and feel no fear when working with them. He needs to be an alert observer—his patients can't answer questions or describe symptoms. Steadiness and calmness are also important, since both animals and their owners react unfavorably to impatience, or rough or abrupt motions.

The prospective veterinarian must be a good student—his schooling is long and technical. He should be particularly interested in scientific studies.

Physical stamina and strength are essential, particularly for anyone who plans to work with large animals. He will receive emergency calls at all hours, in all kinds of weather, and sometimes will have little help in handling the sick or injured animals. All veterinarians face the possibility of exposure to disease, and so must be careful at all times to follow recommended precautionary measures for avoiding undue risks.

Girls who want to become veterinarians shouldn't be discouraged from taking up this career. The majority of women in veterinary medicine are small animal practitioners working in animal hospitals. Some have been successful in large animal practice. All accredited veterinary colleges in the United States and Canada accept qualified women students.

Education and Training

Anyone planning to become a veterinarian should count on a minimum of 6 years of schooling after graduation from high school. He must have at least 2 years of preprofessional study at a liberal arts or agricultural college. He then enters an approved college of veterinary medicine, which gives a 4-year course leading to the degree of doctor of veterinary medicine (D.V.M.).

Although only 2 years of college are required, it is best to have a full 4 years of college work, with a bachelor's degree. The extra years give the student a broader cultural background—and mean that he has more to offer his profession and the community which he will serve. Also, competition is keen for entry to schools of veterinary medicine; other things being equal, the college graduate has a better chance of acceptance.

In 1971, there were 18 approved veterinary schools in the United States and three in Canada.

Before entering college, the prospective veterinary student should write to the veterinary school of his choice and ask about entrance requirements. Since these vary from school to school, it is necessary to have this information before planning college studies. Usually, emphasis is placed on inorganic and organic chemistry, biochemistry, zoology, botany, physics, English composition, and speech. (Studying some of these in high school may make college work easier.) Latin is recommended because it helps the student understand medical terminology.

In 1971, all colleges of veterinary medicine in the United States were located at State-supported institutions except the University of Pennsylvania. In some areas of the country, States which do not have veterinary schools of their own cooperate on a regional basis with schools in other States. This helps to equalize opportunities for studying veterinary medicine. Chances of admission in times of crowding are best for students with high scholastic averages.

Licensing

After the student is graduated from a college of veterinary medicine, he must obtain a State license before he can practice. This is granted only after he has passed an examination given by a State board of veterinary medical examiners. Licenses granted by one State are not necessarily recognized in others. Therefore, the veterinarian must check local rulings before establishing himself in another State.

Veterinary Private Practice

A majority of veterinarians—an estimated 60 percent—go into private practice. Most of them handle all kinds of domestic animals. Rural veterinarians may practice largely with cows, horses, swine, or poultry. Veterinarians living in cities or large towns usually treat only household pets, but may care for farm animals as well. A small number of veterinarians specialize in zoo and circus animals, or in animals that are raised commercially for their fur.

The veterinarian who begins private practice in a farming area must count on investing several thousand dollars in drugs, instruments, and an automobile, so that he can provide needed treatment and get to his patients.

Rural veterinarians who develop large practices sometimes build clinics or hospitals, where animals can be brought for treatment and surgery, but many practice from offices and travel to their patients. They make use of many modern methods of communication and transportation. It is not at all unusual for the rural veterinarian to keep in touch with his office by radio-telephone, or to fly his own plane.

In addition to the work he does with his animal patients, the rural veterinarian also has the responsibility of teaching farmers and their families about diseases which farm animals can transmit to people, and of showing them how to protect themselves. Brucellosis, for example, may attack a farmer who is not careful in handling infected cattle; and ringworm in cattle, horses, or smaller pets may spread to the entire family if strict precautions aren't taken.

Rural veterinarians frequently combine private practice with part-time work for Federal, State, or local government. This public service may be concerned with control and eradication of animal diseases, or it may involve the inspection of foods of animal origin, such as meat and poultry.

Veterinarians in private practice in cities usually work only with household pets, though they too may do some work for local health departments. City veterinarians usually have a fully equipped animal hospital for their patients—a fact which makes this an expensive specialty for the beginner. Anyone planning to go into such practice should study the community very carefully before making the investment. Often it is better to associate with an established practitioner, as an assistant or junior partner.

Veterinary Public Health

The veterinarian fits with special ease into the public health field, because he has been trained to consider diseases as they affect animals in groups. Prevention rather than treatment is stressed—and prevention is the keystone of public health.

More than 11 percent of all veterinarians work directly in the public health field—for the Federal Government, State, or local agencies, and international groups. For example, the Agricultural Research Service of the U.S. Department of Agriculture has a full-time staff of veterinarians to inspect meat in packing plants and to work throughout the country on the control and eradication of animal diseases. Other veterinarians in this Department supervise stockyards, inspect poultry, and enforce the quarantine regulations and various rules about importing and exporting animals and animal products. They also do research work and supervise the licensing of firms manufacturing serums and vaccines for animals. The U.S. Food and Drug Administration also employs veterinarians.

A veterinary public health section has been organized in the U.S. Public Health Service. These men develop programs for controlling animal diseases that affect public health, help the States establish veterinary public health programs, and serve as consultants in other Public Health Service activities. This nationwide service provides a broad base for tackling widespread problems, and has proved effective in reducing the spread of many diseases from area to area. Other functions of veterinary medicine within the Public Health Service are to collect and evaluate statistical data on human illnesses caused by animals, to study the effects of air pollution on animals, and to conduct basic research on chronic and communicable diseases.

Veterinarians employed by State and local health departments cooperate with private practitioners and Federal field workers to control disease among animals and also to protect human health. Some counties and many cities employ veterinarians to see that meats and dairy products are wholesome and that they are sold in clean surroundings. In other instances, veterinarians supervise the production of biologicals—serums, antitoxins, and the like—used in the prevention and treatment of disease in human beings.

Internationally, veterinarians are on the central and regional staffs of the World Health Organization and the Food and Agriculture Organization of the United Nations. During the years following World War II, veterinarians worked with the United Nations Relief and Rehabilitation Administration to help war-torn countries build up their supply of food animals. Now, they are working with the U.S. Foreign Operations Administration to provide economic and technical aid to underdeveloped countries.

The veterinarian who is interested in a public health career needs special training in addition to this education in veterinary medicine. It is recommended that he get a year or two of practical experience, and then enroll for a program of postgraduate study in an accredited school of public health. Specialized courses will help him to understand how comprehensive health programs are developed, and to see how veterinary medicine can contribute to such programs. This postgraduate work leads to a master's degree—usually master of public health.

In this atomic age, a new responsibility for veterinarians is membership on the radiological health team in various health administrations. Training courses in radiology and its health aspects are now given to all veterinary officers of the U.S. Armed Forces, and also to veterinarians who work in State and local health departments. Veterinarians are likewise playing an important role in civil defense programs—studying how to protect both man and animals against atomic, biological, and chemical warfare.

Military Veterinary Medicine

Progress in veterinary medicine has been influenced to a major degree by the veterinary activities of the U.S. Armed Forces. Today, commissioned officers of the veterinary corps of the Army and the Air Force work side by side to protect our military personnel now stationed in all parts of the world. During World Wars I and II, and the Korean and Vietnam conflicts, they were largely responsible for the low incidence of food poisoning and food-borne disease among our troops.

The veterinary officer has an obligation to protect the Government's pocketbook, and accomplishes this by rejecting substandard food products, and by developing more effective ways of preparing, producing, and serving foods. Often he is assigned as a part of the medical team to work on newly recognized diseases of animals and man. He has the duty of giving medical care to animals used for guard duty and other purposes. Above all, as a member of the medical department, he cooperates with his colleagues—the physician, dentist, nurse, or other specialist—on problems affecting the health of the Armed Forces, in training and in the field, at home and abroad.

Research and Other Fields

Some veterinarians with special talents go into teaching—in schools of veterinary medicine, public health, or medicine. Others are employed by firms which produce or sell biological and pharmaceutical products for animal and human use. In specialized industrial fields, veterinarians are employed on a consultant basis.

Veterinarians who are interested primarily in laboratory work and research will need postgraduate study, leading to a master's or doctor's degree. They may obtain such training in certain medical schools, schools of public health, schools of veterinary medicine, or graduate schools of the larger universities.

Prospects

Whether a veterinarian goes into private practice or takes a salaried post, he is entering a profession with high standards of service. His skills are needed in many areas, and he will often work in partnership with other highly trained men and women in the health field.

Naturally, the private practitioner must expect the usual drawbacks of working on one's own—irregular hours, emergency calls, and a fluctuating income. All veterinarians have in common the problems of exposure to disease and the possibility of being injured by animals during treatment.

DOT Code:	Veterinarian	073.108–014
	Veterinarian, Laboratory Animal Care	073.081–010
	Veterinarian, Public Health	073.108–018
	Veterinary Anatomist	073.081–014
	Veterinary Bacteriologist	073.081–018
	Veterinary Epidermologist	073.081–022
	Veterinary Livestock Inspector	073.181–010
	Veterinary Meat-Inspector	168.284–014
	Veterinary Parasitologist	073.081–026
	Veterinary Pathologist	073.081–030
	Veterinary Pharmocologist	073.081–034
	Veterinary Physiologist	073.081–038
	Veterinary Virologist	073.081–042
	Veterinary Virus-Serum Inspector	073.281–010

For further information, write to:
American Veterinary Medical Association
600 South Michigan Avenue
Chicago, Illinois 60605

Visual Services and Eye Care

Safeguarding vision—helping people to see better or more comfortably—involves many services, each with special responsibilities and skills. Medical eye care, of course, can be given only by the physician with special training in ophthalmology. No one else is qualified to deal with eye diseases or with eye conditions that are either brought on or affected by disease elsewhere in the body. (See the section on Medical Professions.) But, in addition to this medical specialty, there are three other services in eye care, each with its distinctive place.

Dispensing Optician

The dispensing optician produces the eyeglasses prescribed by an ophthalmologist (eye doctor). He measures facial contours in order to select the frame and lens shape best suited to the individual's features. Then he has the lenses ground according to the prescription and patient's measurements, fits them into the assembled frame, and fits and adjusts the finished glasses.

If he has a considerable number of patrons, he employs other opticians, known as dispensers, to do

A dispensing optician adjusts a client's glasses to insure a comfortable and precise fit.

the work of interpreting and fitting. He usually has a room where the benchwork on glasses is done—where the lenses are edged to fit the frame and then assembled with the frame into the finished glasses.

The actual grinding of the surfaces of the lenses may also be done in the optician's shop although this service is available through jobbers and wholesalers. In either case, such mechanical work is done by an optical technician.

The scope of the dispensing optician's duties has broadened with the increasing popularity of contact lenses. Today, over five million Americans wear contact lenses. Users of these lenses are instructed by the dispensing optician in how to insert, remove, and care for the thin plastic disks, which are less than one-half of an inch in diameter. In fitting contact lenses, the dispensing optician follows the eyedoctor's prescription, just as he does in fitting conventional glasses. But with contact lenses he must also obtain accurate measurements of the cornea of the eye. In addition, he must work skillfully with precision instruments which measure the power and curvature of the lens.

A beginner in the field of opticianry may start out as an apprentice technician to learn the technical work of lens grinding and fitting. In States where opticians are licensed, this knowledge is needed in order to pass the examinations. Students who attend an accredited opticianry school will get such shop experience in their courses.

The trained worker may choose to become a dispenser, or to go into business for himself as a dispensing optician, or to enter into other phases of optical work.

Aptitudes and Training

Since the optician must do precise and accurate handwork in any of several jobs, he needs manual dexterity. An aptitude for mathematics is important. Patience, ability to follow blueprints or sketches, and skill in the use of tools and instruments are other qualifications. While the work is not strenuous, certain aspects of it require a considerable amount of standing and walking.

In 1970 there were approximately 10,960 opticians in the United States; 1,254 of these, or about 11.5 percent, were female. Opportunities for women in this field are excellent.

Sixteen schools of opticianry and vocational schools in the United States offer courses in optical technology. Educational standards in this field are set by the American Board of Opticianry, Buffalo, New York.

An applicant for apprenticeship must have a high school education or its equivalent and be at least 17 years of age. The term of apprenticeship is 3 years (6,000 hours) and includes a minimum of 150 hours per year of related instruction. The first 6 months (1,000 hours) of the program is considered the probationary period.

An apprentice whose progress is rapid and who achieves the desired level of attainment for a designated period of the apprenticeship may be advanced to the next stage—journeyman—sooner than the stipulated time period.

Seventeen States require the dispensing optician to be licensed. In addition, California and Hawaii license opticianry establishments. Two States, Connecticut and New Jersey, require a license for optical technicians.

Prospects

Employment opportunities are very good throughout the country. Shopwork itself can be satisfying and well paid with opportunities for becoming a supervisor or shop foreman in a wholesale or large retail establishment. Or it can lead to work as a dispenser and eventually to a career as dispensing optician. With a small capital outlay one can open his own establishment as a retail dispenser.

DOT Code:	Optician	713.381–014
	Optician Apprentice	713.381–018
	Optician, Contact-Lens Dispensing	711.381–018
	Optician, Dispensing	713.251–010

For further information, write to:
Guild of Prescription Opticians
of America, Inc.
1250 Connecticut Avenue, N.W.
Washington, D.C. 20036

Optometrist

An optometrist, doctor of optometry (O.D.), is educated and trained to examine eyes to detect vision problems. He may prescribe eyeglasses or contact lenses, as needed, or he may recommend other optical treatment to preserve or to improve eyesight. If evidence of eye disease or injury is observed, he refers the patient to an ophthalmologist for diagnosis or treatment.

After lenses are ground to the optometrist's prescription in an optical laboratory, he fits them to frames suitable to the patient and styled to the patient's features. The optometrist then adjust the eyeglasses as required to make them both comfortable and effectual.

In addition to this principal function, an optometrist may render service in any or all of the following areas:

Contact Lenses: Recent years have seen greatly increased use of contact lenses. Much of the research and development has been done by optometrists. Some optometrists now devote their entire attention to prescribing and fitting contact lens. To others it has become an ever increasing part of their general practice.

Children's Vision: Optometry is playing a leading role in discovering and solving children's vision problems, especially in the development and use of vision training and in orthoptics. Many optometrists specialize in children's vision; others serve as consultants to schools and school systems.

Aids for the Partially Sighted: Many of the effective aids for the partially sighted have been developed by optometrists. Through their research, telescopic and microscopic lens systems have been improved to benefit many in the older age group; these aids have also helped thousands of children with seriously impaired vision.

Vision Training: Vision training has long been recognized as an effective method of correcting some types of crossed eyes. It is also useful as a way to sharpen visual perception and to improve vision for reading. Some optometrists devote a large part of their time to this specialty; others include it as one of several services. (In this connection, see also the item on the Orthoptist later in this section.)

Training

Students should begin early to take courses in the fundamental sciences—mathematics, chemistry, physics, biology, neurology, physiology, anatomy, and psychology. All colleges of optometry require 2 years of preoptometric college study, but today many beginning optometry students complete a 4-year college course before entering their professional training. The 11 American colleges and one Canadian college accredited by the American Optometric Association require the completion of a 4-year course of professional training for the degree of doctor of optometry.

There are many scholarships offered by State optometry associations as well as the universities and colleges. Each year, a comprehensive list of scholarships is compiled by the American Optometric Association and information on this subject may be obtained there. Financial assistance may also be obtained by educational loans under the Health Profession's Educational Assistance Act.

State Licensing

To practice in a particular State, the optometry college graduate must obtain a license in that State. He does this by passing the comprehensive examination given by the State board of examiners for licensure.

In the event of later relocation in another State, an optometrist may be licensed in his adopted State by reciprocal agreement. Most States will extend this privilege to optometrists from other States if they have been in practice for several years. Some States may require re-examination.

Getting Started

Many optometrists go into private practice.

There are many opportunities for new graduates to associate themselves with established optometrists who need assistance or are preparing for retirement. The American Optometric Association serving as a clearinghouse for associate opportunities provides a placement service for its members. Generally there are more openings than interested graduates.

There are also opportunities for optometrists in industry, in public hospitals, in numerous government agencies, and as commissioned officers in all branches of the Armed Forces. Great need exists for men and women to teach optometry or to conduct research. These careers, however, require a graduate degree.

There were about 18,000 licensed optometrists in the United States in 1970. To keep pace with population growth and to replace optometrists who will retire, 20,000 more must be educated by 1980.

DOT Code: Optometrist 079.108–026

For further information, write to:
American Optometric Association
7000 Chippewa Street
St. Louis, Missouri 63119

Orthoptist

In treating the condition of crossed eyes, many ophthalmologists have assistants called orthoptists. The orthoptist has a highly specialized job in the field—helping youngsters or adults to overcome this handicap. Many orthoptists are women.

Orthoptics literally means straight eyes. However, the orthoptist does not try to "uncross" eyes. Instead, she teaches the patient exercises which help the misaligned eyes to work together as a team, to see together with properly fused vision. This work is done under the ophthalmologist's supervision.

The orthoptist is really a teacher, like the special teacher for reading problems. Since much of her work is done with children, she must be able to win the confidence and cooperation of the youngsters and their parents. A patient, understanding personality is a necessity. General good health and good appearance usually are required.

Before she can study orthoptics, a candidate must be at least 20 years old, and must have 2 years of college or comparable education. One training school requires a college degree.

To obtain her specialized training, the candidate may go directly to one of the schools giving a 15-month course of training in orthoptics. Or she may be placed in a training center for the same period of practical work under the supervision of a certified orthoptist, combining this with the basic 2-month course offered by the American Orthoptic Council.

A certificate is issued by the American Orthoptic Council to qualified students who pass an examination given by the council. There is no legal requirement to obtain such certification, but more than 95 percent of all medically trained orthoptists are certified.

Since the orthoptist usually functions as an assistant to the ophthalmologist, she will find work chiefly in cities where eye specialists are located. Orthoptists may also be needed in specialized hospitals and clinics.

DOT Code: Orthoptist 079.378-030

For further information, write to:
American Orthoptic Council
3400 Massachusetts Avenue, N.W.
Washington, D.C. 20007

Vocational Rehabilitation Counseling

Many different services go into rehabilitation—the process by which a sick or disabled person is restored to normal or near-normal functioning.

One is concerned with repairing the damage done by the illness or injury. This is the responsibility of the physician.

Another has to do with restoring the person to his former level of vocational performance or, if this is no longer possible, of preparing him for a new vocation. This is the function of vocational rehabilitation counseling.

Most illnesses leave the patient with little or no residual handicap. Others may cause long-lasting or permanent damage to physical or mental functioning. Polio may cripple the limbs; glaucoma may cause blindness; a heart attack may impose a drastic limitation on physical activity; a psychotic breakdown may affect memory, concentration, and ability to relate to others.

Handicaps such as these may not only prevent the individual from taking up his former occupation, but may also demoralize him to a point where he no longer has the motivation to learn another trade or profession, or the courage to find another job.

It is the function of the vocational rehabilitation counselor to help the handicapped or disabled person to overcome these obstacles. It is the counselor's responsibility to help the client decide on a realistic vocational goal and then help him work toward this goal—placement in a satisfactory job. This may involve not only extensive vocational training but also the reshaping of negative attitudes and the development of confidence and motivation.

Vocational Rehabilitation Counselor

As soon as the injury or illness is brought under control and the client is at a point where he can function again, the vocational rehabilitation counselor steps into the picture. His task is to help the client minimize his handicap by capitalizing on his other resources—his aptitudes, skills, and interests.

For example, the counselor cannot create a new pair of eyes for a blinded watchmaker, but he can help him explore other opportunities where his manual deftness can be put to use, as in the production of electrical equipment. Through retraining, the disabled worker learns to apply his abilities to a new job, sometimes closely related, sometimes far removed from his old one. Even in the case of handicapped or retarded young people who have never worked at all and who may have been considered unemployable, the counselor can frequently devise a training program that can lead to employment.

To learn as much as he can about the client, the counselor conducts interviews with the client himself, his family doctor, former teachers, former employers, and others.

The counselor himself may administer various aptitude tests and psychological tests or refer his client to a testing specialist. If emotional problems seem to be interfering with adjustment, a psychologist or psychiatrist may be called in.

When enough has been learned about the client, the next step is to develop a vocational plan. Both the client and counselor share in the planning, and others who may be involved are also called in—members of the family, the prospective employer, the social worker, and so on.

The actual training generally takes place in a sheltered job situation, where the trainee may learn his new occupation without the competitive pressures of regular employment. While training is in process, the counselor keeps in touch with the client, to observe his progress and to be of continued help to him. When the training is completed, he helps the client to find a job.

To be of greatest help, the counselor must know the employment situation and employment opportunities, especially those for handicapped people.

In recent years, there has been a tendency for rehabilitation counselors to specialize in services for particular groups—the blind, paraplegics, the mentally ill, the retarded, and others. Perhaps the fastest growth in the counseling field is in work with disabled persons who are also socially disadvantaged.

Experienced workers divide their time between client counseling and broader community activities in the interest of the overall program—for example, calling on employers to solicit jobs, keeping in touch with educators and other interested professional groups, and taking part in meetings of local organizations and other activities which will help to focus public attention on problems of the handicapped and the benefits of rehabilitation.

Education

The minimum requirement for a beginner's job in rehabilitation counseling is a bachelor's degree, preferably in psychology or education. Some experience in such related fields as vocational guidance and placement, personnel work, psychology, social work, or teaching also may be helpful.

Specialized professional education for rehabilitation counseling starts after college with work leading toward a master's degree. In some rehabilitation agencies, this additional training is required before employment. Such programs require from 1½ to 2 years of graduate-level study. This will include courses in rehabilitation problems, counseling techniques, vocational guidance, occupational and medical information, test administration and evaluation, psychology, statistics, and personnel administration. Additional courses might look toward the community relations aspect of the rehabilitation program—for instance, public speaking, public relations, and methods of developing local job resources for the disabled.

Some rehabilitation counselors take additional graduate work and get a doctor's degree. This usually takes a total of from 4 to 6 years after college—part of it covered by the time required for the master's degree. Doctoral training usually goes into the more complex aspects of rehabilitation. This is supplemented by advance work in the social sciences, and (as in other Ph.D. programs) the student is expected to complete a considerable amount of original research.

Traineeships in rehabilitation counseling are now being offered by 69 universities under grants provided through the Rehabilitation Services Administration in the U.S. Department of Health, Education, and Welfare. An interesting feature of these Federal traineeship grants is the requirement that, as part of their academic training, graduates have practical experience in working with disabled individuals.

Places of Work

All 50 States have rehabilitation programs and services, financed jointly by Federal and State funds. More than 10,000 rehabilitation counselors are now employed in these State programs. Some are based in the agency's headquarters or field service stations; but there is also a trend toward assigning special counselors to work in mental hospitals, rehabilitation centers, sheltered workshops, and other special projects. Though these State agencies are the largest employers of rehabilitation counselors, there are also opportunities in Veterans' Administration hospitals and in other public and private hospitals, and also in special schools, mental health centers, correctional institutions, voluntary health agencies, and other organizations with rehabilitation interests. For civil service appointments in government agencies, a competitive examination is usually required.

Employment Conditions

Counselors usually observe a typical 40-hour week, although they are often expected to participate in various after-hours community activities related to rehabilitation. As already noted, out-of-office contacts and community relations generally play an important part in vocational rehabilitation. In the course of the day's work, the counselor is in touch with many people in many places—with his clients and their families in their own homes, physicians and other members of the hospital staff, professional people in welfare agencies and similar organizations, school people, local public employment offices, employers' groups and individual employers, labor unions, and other sources of jobs or job information.

Job Outlook

The supply of qualified counselors is currently lagging far behind demand, and this situation is expected to continue for the foreseeable future. (Similar needs exist in most of the occupations involved in restorative and rehabilitation services.) Increased emphasis on rehabilitation for those disabled by chronic illness and for the mentally ill and the retarded; the Federal Government's commitment to social welfare and antipoverty programs; changes in the job market; expected population growth—these and other trends indicate that no well-trained counselor will lack for career opportunities in the years ahead. Although there will probably be many openings for those with only a bachelor's degree, counselors with graduate training can naturally be expected to obtain employment more readily and to have better prospects of advancement.

DOT Code: Vocational Rehabilitation Counselor 045.108–036

For further information, write to:
Rehabilitation Services Administration
U.S. Department of Health, Education,
and Welfare
Washington, D.C. 20201

Voluntary Health Agency Administration

Voluntary health agencies occupy a unique place among our community health partnerships. Theirs is a pioneer function—to recognize and act upon emerging needs. For a reminder of their role in promoting good health and their place in the community health picture, turn back to the section on An Overview of the Health Field and reread its description of the voluntary health agency partnership.

Community activities have a special place in the programs of all our voluntary health agencies. For one thing, they are organizations in which all of us can participate as individuals, and each "local" unit therefore has the closest possible relationship with the people of its own community. In addition, most of these "community" units are affiliated with one or another of our great national voluntary agencies, and each therefore represents one of the local links in this parent agency's nationwide network of health services.

Though each national agency has its own plan of organization, all of them have arrangements for maintaining close working relationships with local affiliates—sometimes through regional or divisional offices as well as through affiliated State agencies. Whatever the plan of national organization, one consideration is always taken into account.

Like people, no two communities are the same, and each "local" voluntary health agency must shape its administrative structure to serve the needs of its "community." Occasionally in a very small community there may be only a single paid executive—or perhaps none at all. But such situations are exceptional. If necessary, in order to provide a broad enough base for effective organization, several small communities may be served by a single consolidated unit. In thinly populated areas, for example, a county or even an entire State may be the "community" covered by the "local" agency. Such an agency, like those in most cities, has a good-sized staff. This is desirable because (like other community organizations) the voluntary health agency must carry on many administrative activities, among them business management and office services, the building of community relationships, and the supervision of professional and volunteer services.

Large or small, voluntary agencies count on volunteer workers for a great deal of help. Working full time, or more often part time, volunteers may share in nearly everything the agency does. They may include all kinds of people—physicians, for example, serving as volunteers to direct professional service programs, as well as housewives, businessmen, and high school students—each helping out wherever his individual experience and capacities make him most useful.

Executive Director

Whatever the size of the community his agency serves, the "local executive" works in close cooperation with the people of the community. To administer in this setting means to get done those tasks that are necesssary to give life to the agency's program. Suppose this local program, as worked out in keeping with the agency's national policy, is designed to help combat a particular health hazard. The executive's job is to involve the community in seeking a solution to the problem and in taking effective action toward solving it. To accomplish this, the executive must undertake a great many interrelated duties. Either as part of his own job or as tasks given to one or more of his administrative assistants, he is responsible for the following:

He works with the agency's board of directors, a responsible group of community teachers, all of whom serve as volunteers. They are the executive mainstay; together they set the course of the agency's activities, develop the program, organize citizen committees, approve staffing plans, and the like.

Knowing that the only basis for a practical and effective program is accurate local information, the executive keeps himself and the community up to date with regard to the health problems with which the agency is concerned and the community's resources for meeting them.

He utilizes all the guidance and resources the agency's national organization offers, in order to strengthen the local unit and make it an effective member of the community health partnership.

He works closely with comprehensive health planning organizations and other agencies in the community to help bring together their various services without overlapping or duplication.

He keeps in close touch with and works with all kinds of community and neighborhood activities—civic, church, labor, government, farm organizations, schools, industries, local newspapers, and radio and television stations. These are channels for getting the agency's service to more people as well as sources of community support.

He helps supervise recuitment, selection, and training of volunteer workers.

He usually takes responsibility for local fund raising within the policies of his national organization.

He develops a budget for consideration by his agency's board or finance committee and administers the funds of the agency.

He carries out personnel functions, including the recruiting, hiring, training, and the supervising of the staff.

He runs the office—which means seeing that all the details of management are efficiently handled.

The executive does not ordinarily have to perform all these duties unaided. For example, one well-established local voluntary health agency employs 16 full-time staff. Of the eight who hold the professional positions, five are involved in the programs through which the agency provides professional health services to the community. The executive, the assistant executive, and a public information officer account for the other three. Either directly or through one of these two associates, the executive handles all the responsibilities just listed. (The office staff consists of the bookkeeper, the executive's secretary, a receptionist who also operates the telephone switchboard, and several clerk-typists.)

The diversity of the local executive's job, and its dedication to the cause of health, are what make this career interesting and worthwhile.

To do a good job and to feel this kind of satisfaction, the executive of a local voluntary health agency needs a combination of qualities, among them:

- Liking and respect for people and tact to work with all kinds, individually and in groups.
- Enough presence and persuasiveness to represent the agency in the community, to speak effectively at meetings, and to serve as chairman of special committees.
- Practical wisdom and a sense of perspective in adopting national policies to meet local needs.
- An interest and ability to keep currently well informed on the trends and developments affecting health care in the Nation.
- The kind of judgment and planning ability that makes it possible to see all sides of a problem—to keep track of details without getting bogged down in them, or losing sight of purposes and goals.

This combination of capacities is the result of maturity and knowledge that comes with experience and education (see section on Qualifications below).

Field Representative

In general, field representatives need the same kind of qualifications—ability, education, and experience—as local executives. The purpose of these field positions is to maintain and strengthen the connecting links throughout the nationwide network of affiliates associated with each of the national voluntary health agencies.

Field services of this kind are an important part of every national agency's operation. Depending on how the agency is organized, its field representatives may work directly out of the headquarters office, or more typically may have their base in one of its divisional or regional offices covering a particular part of the country. In either case, the national agency field representative covers many different communities, and many kinds of communities, over a fairly large geographical area. This would involve a good deal of travel, which many people consider attractive.

His job is to maintain the contacts through which the national organization and its affiliates communicate with each other and work together. Even more important, he brings national resources to bear on local problems and helps the local executive by acting as a consultant for the program in his community. In addition to providing this kind of advice and assistance for existing affiliates, the field representative also has broad responsibility for helping any communities in his area which do not have affiliated local units. Here, he works with community leaders—to consider what his agency can do to help the community; to develop ways and means of setting up a local unit; and, once the unit is organized, to help find the necessary staff.

Paralleling and supplementing these national field services are similar services provided by some State affiliates and by some of the larger local affiliates. Such services are provided wherever they are needed—for example, to cover a number of more or less isolated communities in a thinly settled area, or to keep in close contact with all the individual communities or neighborhoods which together compose a suburban complex surrounding a major city. In these areas, the field representative of a State or local agency performs many of the same tasks as those of the national agency field staff, bringing together and giving advice and assistance to the subcommunities which are part of the State or local agency.

Qualifications

As with any other administrative career, a well-rounded education will be of value in this field. Most major national agencies prefer college graduates for their administrative positions. This education does not have to be in the health field but it should be as broad and flexible as possible. A major in any one of the following would provide a good foundation: social sciences, public or business administration, psychology and human relations, journalism and other subjects relating to communication.

Positions such as local executive and field representative usually require some prior experience. This may be in a voluntary health agency, State or local health department, social service agency, or education department.

Some people go directly into voluntary health agencies immediately after graduating college. The first job may very likely be that of junior staff member in a local unit or perhaps in a national agency division office. This could include an assignment either as a member of the general office staff or as a worker in one of the agency's community-service programs. Experience leads to promotion, to positions of increasing responsibility requiring independent administrative judgment and action, ultimately to the job of executive or field representative.

During these years, further education can be accumulated, in addition to experience. In good-sized local voluntary health agencies, the requirements for the executive are likely to include a master's degree in an appropriate field, as well as several years of previous experience in the administration of community health programs.

In general, graduate courses related to voluntary health agency interests cover such fields as public administration, public health and public health education, and community organization. Education leading to a master's degree in any one of these fields usually takes a year of academic work. It may also include some provision for an internship or some other form of practical experience.

With the growing emphasis on the importance of voluntary health agency administration, a number of special postcollege courses are conducted in many parts of the country. Such courses are usually open only to those who already have professional experience in voluntary agency administration or who are able at least to meet the standards for such positions. Current examples of such courses include short-term institutes; combination on-campus and correspondence courses together covering an academic year; and full-scale academic programs leading to a master's degree.

Many current developments combine to underscore the importance of this trend toward increasing emphasis on graduate training. Most important, perhaps, is the extent to which the voluntary health agencies have grown—not just in numbers and in size of membership, but in their standards for professional administrators and in their program objectives. By tradition, these organizations are pioneers in stimulating health progress. As a group, they continue to stand well in the vanguard among the organizations that help to support research not only in biomedical sciences but also in health, economics, and sociology.

Prospects

Salaries for administrative positions in voluntary health agencies cover a wide range, depending not only on the worker's training and experience, but also on the organization and staffing pattern of the particular agency, its size, financial resources, and geographical location. Because of these variations, representative salary figures for local executives are not available.

One thing to bear in mind is the geographical spread of the national agency networks. There are affiliates of some of the national organizations in nearly every locality, and most of these local units are likely to need competent people for jobs within the immediate community. Those interested in traveling should consider a field representative's job. Field representatives working for national voluntary agencies often cover a great deal of territory.

Even more important than these questions of location is the fact that the voluntary agencies, like other health organizations, have a continuing need for competent people with many different kinds of training and experience—including those with business and clerical skills. This is an area where many recent college graduates may begin their careers in voluntary health agencies. Salaries for these jobs would be at the same level as similar positions in governmental agencies.

Looking to the future, present leaders in the Nation's voluntary health agencies see continuing career opportunities ahead for today's young people. People who entered the field a few years ago, especially those who have been reinforcing their practical experience with specialized graduate education, are serving in responsible administrative positions in local and regional agencies, or as field representatives attached to a large local or State agency, a regional office, or national headquarters.

From their ranks will be recruited new members of the national agency's executive staff—the division heads and those in other top administrative positions who make up the national director's "cabinet" and share with him in broad responsibility for policy and program, as well as for day-to-day administration. The members of this group are likely to have very much the same kind of basic qualities as the local executive and the field representative, but they also have the additional training and experience and the capacity of leadership.

People who have already made a career for themselves in this health partnership would probably explain why they like it by underscoring two key words repeated throughout this section:

Voluntary: Whatever these workers and their organizations accomplish depends on earning the confidence and understanding of the community's people—the men and women and young people who help to support its program both as contributors and as volunteer workers.

Community: Not only for the frontline workers who serve in local units, but also for their colleagues at national, regional, or State levels, the focus on direct community action gives a high visibility to all their efforts. In a local setting, it is possible to get a closeup view of every step, from planning to accomplishment, in every project, and to see what gets results (or doesn't) from start to finish.

Related Occupations

For an overview of the many occupations that may have a place in the voluntary health agency partnership, see the descriptions in the section on An Overview of the Health Field. In local agencies, one of these—the health information specialist—may be considered as part of the local executive's administrative staff. In larger organizations, professional people heading service programs may have substantial administrative responsibilities.

Business and clerical positions in a voluntary agency are very much like the comparable positions described under Hospital and Health Services Administration.

DOT Code:		
	Director, Community Organization	187.118-014
	Field Representative	187.268-010

For further information, write to:

National Health Council
1740 Broadway
New York, New York 10019

SALARY CHART

This chart provides a general picture of the salaries for a representative group of health occupations described in the *Guidebook*. Most figures given represent the 1971 mean starting salary and the mean maximum salary. Footnotes explain other information categories given.

Specific salaries are influenced by many factors, including the education, training, and experience of the worker, the geographic location of the occupation, the size of the institution in which the occupation is found, and whether or not the occupation is one which occurs in private practice.

Administrative Assistant	**$ 8,286 - 11,220**
Biochemist	**10,800 (BS)** **12,500 (Master's)** **15,800 (Ph. D.)** [1]
Certified Laboratory Assistant	**5,604 - 7,080**
Computer Operator	**6,456 - 7,908**
Computer Programer	**8,484 - 10,860**
Cytotechnologist	**7,080 - 8,500**
Dental Assistant	**3,600** [2]
Dental Hygienist	**7,000** [1]
Dental Laboratory Technician	**5,824** [3]
Dentist	**29,000** [1]
Diagnostic X-ray Technologist	**6,612 - 8,268**
Dietitian	**8,280 - 10,260**
Electrocardiograph Technician	**5,268 - 6,420**
Electroencephalograph Technologist	**5,664 - 7,080**
Executive Housekeeper	**6,396** [4]
Food and Drug Inspector and Analyst	**8,098** [2]
Food Service Supervisor	**5,252** [4]
Histologic Technician	**6,396 - 7,968**
Hospital Administrator	**10,000 - 13,000** [2]
Inhalation Therapist	**7,176 - 8,676**
Licensed Practical Nurse	**5,700 - 7,140**
Medical Assistant	**6,500 - 8,320** [1]
Medical Librarian	**7,836 - 9,864**
Medical Record Administrator	**8,316 - 10,000**
Medical Social Worker	**9,264 - 11,600**
Medical Technologist	**7,900 - 9,900**
Nuclear Medical Technologist	**7,512 - 9,000**

SALARY CHART continued

Occupational Therapist	8,268 - 9,984
Occupational Therapy Assistant	6,500 - 7,800 [1]
Optometrist	25,000 [1]
Osteopathic Physician	25,000 - 30,000 [1]
Pharmacist	10,600 - 13,000
Physician	34,000 - 39,000 [5]
Physical Therapist	8,340 - 10,284
Podiatrist	21,500 [1]
Professional Nurse	7,900 - 9,700
Psychologist	9,600 (Master's) 10,900 (Ph. D.) [2]
Recreational Therapist	7,656 - 9,204
Safety Engineer	9,732 - 11,400
Sanitarian	7,000 - 7,500 [2]
Speech Pathologist and Audiologist	9,144 - 12,588
Sociologist	15,000 [1]
Technical Writer	5,000 - 7,000 [2]
Vocational Rehabilitation Counselor	8,384 - 10,876 [6]

[1] Average income, 1970.

[2] Starting salaries, 1970.

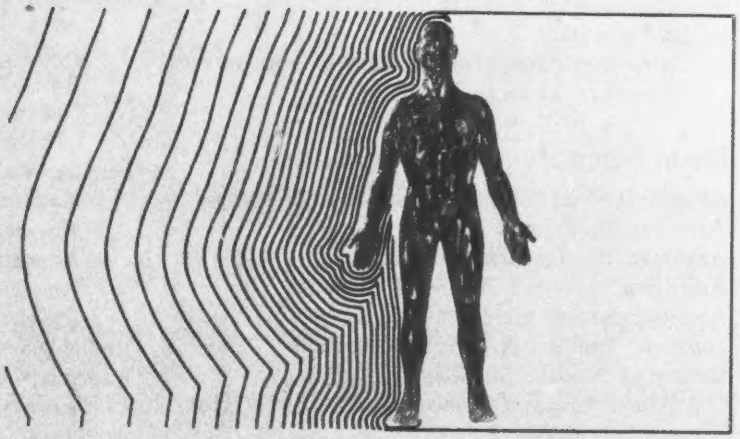
[3] Starting salaries in the Federal Government, 1970.

[4] Average income, 1969.

[5] Estimated net income of physicians in patient care, 1970.

[6] Salary ranges of selected State classes, 1971, U.S. Civil Service Commission.

The information in this chart is based on the material made available by the Bureau of Labor Statistics, U.S. Department of Labor.



Referral List

Designed as a supplement to the health career job descriptions, this list identifies organizations which can supply information on particular health occupations or on related questions concerning college and career planning.

This listing includes the reviewing agencies for each job description and other organizations taken from the National Health Council's pamphlet, "Where To Get Health Career Information."

To simplify the locations of sources on particular occupations, Part I is set up topically. Part II gives the mailing address of each organization.

Part I

Administrative, Business, and Clerical Specialties

- Accountant
  - American Association of Hospital Accountants
  - Hospital Financial Management Association
- Administrator
  - American College of Hospital Administrators
  - American Hospital Association
  - American Nursing Home Association
  - Association of University Programs in Hospital Administration
- Business Office Manager
- Controller
  - Hospital Financial Management Association
  - National Executive Housekeepers Association, Inc.
- Medical Assistant
- Medical Secretary
  - American Association of Medical Assistants
  - American Medical Technologists

Basic Sciences and Engineering

- Alliance for Engineering in Medicine and Biology
- American Institute of Physics
- American Physiological Society
- American Society of Biological Chemists, Inc.
- American Society of Microbiology
- American Institute of Biological Sciences
- Society of Nuclear Medicine
- U.S. Atomic Energy Commission—Division of Technical Information
- National Institutes of Health—Department of Health, Education, and Welfare

Clinical Laboratory and Related Technical Services

- Biomedical Engineer
- Biomedical Equipment Technician
  - Association for the Advancement of Medical Instrumentation
  - Biomedical Engineering and Instrumentation—Branch, NIH
  - Biomedical Engineering Society
  - Engineers Joint Council
- Blood Bank Technologist
  - American Association of Blood Banks
  - American National Red Cross
  - National Hemophilia Foundation
- Cytotechnologist
  - American Cancer Society
  - American Society of Clinical Pathologists
  - American Society of Medical Technologists
  - American Medical Technologists
- Electrocardiograph (EKG or ECG) Technician
  - American Hospital Association
- Electroencephalograph (EEG) Technician
  - American Society of Electroencephalographic Technologists
- Histologic Technician
  - American Society of Clinical Pathologists
  - American Society of Medical Technologists
  - American Medical Technologists
- Laboratory Assistant
- Medical Technologist and Technician
  - American Medical Technologists
  - American Society of Clinical Pathologists
  - American Society of Medical Technologists
  - National Committee for Careers in the Medical Laboratory
- Nuclear Medical Technologist and Technician
  - American Registry of Radiologic Technology
  - American Society of Clinical Pathologists
  - American Society of Medical Technologists
  - American Society of Radiologic Technologists
  - Society of Nuclear Medical Technologists
- Radiologic (X-ray) Technologist and Technician
- Radiation Therapy Technologist
  - American Society of Radiologic Technologists
- Additional Resources
  - Association of Schools of Allied Health Professions
  - American Medical Association
  - U.S. Atomic Energy Commission

Dental Services

- Dentist
  - American Association of Dental Schools
  - American Dental Association
- Dental Assistant
  - American Dental Assistants' Association
- Dental Hygienist
  - American Dental Hygienists' Association

Dental Laboratory Technician
  National Association of Certified Dental Laboratories, Inc.
Additional Resources
  Veterans' Administration

Dietetics and Nutrition

Dietetian
Dietary Assistant
Dietary Aide
  American Dietetic Association
Nutritionists
  American Home Economics Association
  American Dietetic Association
Additional Resources
  Food and Drug Administration
  Institute of Food Technologists

Economic Research

National Center for Health Services, Research and Development

Environmental Health

Air Pollution
Industrial Hygienist
Sanitarian
  American Industrial Hygiene Association
  International Association of Milk, Food and Environmental Sanitarians, Inc.
  National Environmental Health Association
Safety Engineer
  American Society of Safety Engineers
Systems Safety Analyst
  National Safety Council
Additional Resources
  American Public Health Association
  National Tuberculosis and Respiratory Disease Foundation
  Planned Parenthood—World Population
  Office of Manpower Development and Training, Environmental Health Service

Health and Medical Research

American Cancer Society
American Heart Association
American Social Health Association
Arthritis Foundation
National Association for Mental Health
National Cystic Fibrosis Research Foundation
National Easter Seal Society for Crippled Children and Adults
National Hemophilia Foundation
National Kidney Foundation
National Multiple Sclerosis Society
National Society for Prevention of Blindness
National Tuberculosis and Respiratory Disease Association
Planned Parenthood—World Population
United Cerebral Palsy Association

Health Statistics

National Center for Health Statistics

Home Care

Home Health Aide
Homemaker
  National Council for Homemaker—Home Health Aide
Additional Resources
  National Council on the Aging

Information and Communications

American Journal of Art Therapy
Association of Medical Illustrators
Biological Photographic Association, Inc.
Blue Cross Association
Council for the Advancement of Science Writing
National Association for Music Therapy, Inc.
Society for Public Health Education
Society of Technical Communications

Inhalation Therapist

American Association for Inhalation Therapy
American Medical Association

Library

Medical Science Librarian
  American Library Association
  Medical Library Association
Medical Record Administrator
Medical Records
Medical Record Technician
  American Medical Record Association

Medicine

Family Physician and other specialists
- American Academy of Family Physicians
- Association of American Medical Colleges
- American Medical Association
- American Medical Women's Association
- National Medical Association

Osteopathic Physician
- American Osteopathic Association

Pathologist
- Inter Society Committee on Pathology Information
- American Society of Clinical Pathologists

Pediatrician
- American Academy of Pediatrics

Physiatrist (Physical Medicine)
- American Academy of Physical Medicine and Rehabilitation

Podiatrist
- American Podiatry Association

Veterinarian
- American Veterinary Medical Association

Mental Health

Psychiatric Aide
- National Association for Mental Health

Psychiatrist
- American Psychiatric Association

Psychologist
- American Psychological Association

Nursing Services

Nurses Aide

Orderly

Ward Clerk
- American Hospital Association

Nurse Anesthetists
- American Association of Nurse Anesthetists

Industrial Nurses
- American Association of Industrial Nurses

Nurse Midwives
- American College of Nurse Midwives
- Maternity Center Association

Licensed Practical Nurse
- National Association for Practical Nurse Education
- National Federation of Licensed Practical Nurses
- National League for Nursing

Registered Nurse
- American Nurses' Association
- National League for Nursing

Nursing Educational Programs
- American Hospital Association
- ANA-NLN Committee on Nursing Careers

Pharmacy

Pharmacy Clerk
- American Association of Colleges of Pharmacy

Registered Pharmacist
- American Pharmaceutical Association

Additional Resources
- American Society for Pharmacology and Experimental Therapeutics, Inc.
- National Association of Boards of Pharmacy

Physician's Assistant

Physician's Assistant
- American Association of Physician's Assistant
- American Medical Association

Public Health

School Health Services
- American Association for Health, Physical Education, and Recreation

Educators
- Society for Public Health Education

Additional Resources
- American Public Health Association

Rehabilitation

Music Therapist
- National Association for Music Therapy, Inc.

Occupational Therapy Assistant

Occupational Therapist
- American Occupational Therapy Association

Orthotists and Prosthetists
- American Orthotic and Prosthetic Association

Physical Therapy Aide

Physical Therapy Assistant

Physical Therapist
- American Physical Therapy Association

Recreational Therapist
- National Association of Recreational Therapists, Inc.

National Recreation and Parks Association
Additional Resources
  American Association for Rehabilitation Therapy, Inc.
  American Congress of Rehabilitation Medicine
  American Corrective Therapy Association, Inc.
  American Rehabilitation Counseling Association
  Association for Physical and Mental Rehabilitation
  Association of Medical Rehabilitation Directors and Coordinators
  Goodwill Industries of America, Inc.
  National Association for Retarded Children
  National Association of Recreational Therapists, Inc.
  National Easter Seal Society for Crippled Children and Adults
  National Rehabilitation Counseling Association
  Registry of Medical Rehabilitation Therapists and Specialists
  Rehabilitation Services Administration
  United Cerebral Palsy Association
  Veterans' Administration

Social Services

Psychiatric Social Worker
Social Work Aide
Social Work Assistant
  American Social Health Association
  American Sociological Association
  National Association of Social Workers
  National Commission for Social Work Careers
Additional Resources
  American National Red Cross

Speech and Hearing

Audiologist
Speech Pathologist
Teachers of the Deaf
  American Speech and Hearing Association
  National Association of Hearing and Speech Agencies

Vision Care

Ophthalmologists
  American Association of Ophthalmology
Optician
  Guild of Prescription Opticians
Optometrist
Optometrist Assistant Technician
  American Optometric Association
Orthoptist
  American Orthoptic Council
Additional Resources
  National Society for the Prevention of Blindness

Voluntary Health Agencies

National Health Council

Part II

Alliance for Engineering in Medicine and Biology
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211 East Chicago Avenue
Chicago, Illinois 60611

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Chicago, Illinois 60611

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American Institute of Physics
335 East 45th Street
New York, New York 10017

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American Medical Association
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American Medical Record Association
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Park Ridge, Illinois 60068

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Washington, D.C. 20006

American Nurses' Association
10 Columbus Circle
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10 Columbus Circle
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Chicago, Illinois 60611

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and Coordinators
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International Association of Milk, Food and
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U.S. Public Health Service
Department of Health, Education, and Welfare
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National Committee for Careers in the Medical Laboratory
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National Commission for Social Work Careers
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Registry of Medical Rehabilitation Therapists & Specialists
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United Cerebral Palsy Association
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Bethesda, Maryland 20014

National Institutes of Health, Bureau of Health Manpower Education, Information Office
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Bethesda, Maryland 20014

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Public Health Service
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National Institutes of Health, Information Office
Office of Public Inquiries
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Manpower Administration
Department of Labor
Washington, D.C. 20210

U.S. Office of Education
Division of Vocational and Technical Education
Health Occupations
Washington, D.C. 20202

Veterans' Administration (054)
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Washington, D.C. 20420

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